



TR-8400



PS-10



SP-40



# SERVICE MANUAL

## TR-8400, PS-10, SP-40

### UHF FM CAR TRANSCEIVER

#### SPECIFICATIONS

##### [K, X type]

##### GENERAL

Semiconductors	MPU 1 ICs 13 Transistors 52 FETs 6 Diodes 74 (K), 76 (X)
Frequency range	440.000 to 449.975 MHz (K) 430.000 to 439.975 MHz (X)
Frequency synthesizer	Digital control, phase locked VCO
Mode	FM (F3)
Antenna impedance	50 ohms
Power requirement	13.8V DC $\pm 15\%$
Grounding	Negative
Operating temperature	$-20^{\circ}\text{C}$ to $+50^{\circ}\text{C}$
Current drain	0.45A in receive mode with no input signal 3.4A in HI transmit mode (Approx.) 1.4A in LOW transmit mode (Approx.) Less than 3 mA for memory back up (from power supply)
Dimensions	147.5 mm (5 - 13/16") wide 51.5 mm (2") high 193.0 mm (7 - 5/8") deep (projections excluded)
Weight	1.5 kg (3.3 lbs) (approx.)

##### TRANSMITTER SECTION

RF output power (at 13.8V, DC, 50 $\Omega$ load)	HI 10 Watts min. LOW 1 Watts approx. (Adjustable)
Modulation	Variable reactance direct shift
Frequency tolerance ( $-20^{\circ}\text{C}$ ~ $+50^{\circ}\text{C}$ )	Less than $\pm 15 \times 10^{-6}$
Spurious radiation	HI Less than -60 dB LOW Less than -50 dB
Maximum frequency deviation (FM)	$\pm 5$ kHz
RPT. Tone burst frequency	1.750 Hz
Microphone	Dynamic microphone with PTT, UP, DWN, switches, 500 $\Omega$

##### RECEIVER SECTION

Circuitry	Double conversion superheterodyne
Intermediate frequency	1st IF 21.6 MHz 2nd IF 455 kHz
Receiver sensitivity	Better than 1 $\mu\text{V}$ for 30 dB S/N Better than 0.4 $\mu\text{V}$ for 12 dB SINAD
Receiver selectivity	More than 14 kHz (-6 dB) Less than 30 kHz (-60 dB)
Spurious response	Better than 60 dB
Squelch sensitivity	0.35 $\mu\text{V}$ (threshold)
Audio output	More than 20 watts across 8 ohm load (10% dist)

Note: Circuit and ratings are subject to change without notice due to developments in technology

##### [W, T type]

##### GENERAL

Semiconductors	MPU 1 ICs 13 Transistors 54 (W), 53 (T) FETs 6 Diodes 80 (W), 79 (T)
Frequency range	430.000 to 439.975 MHz
Frequency synthesizer	Digital control phase locked VCO
Mode	FM (F3)
Antenna impedance	50 ohms
Power requirement	13.8V DC $\pm 15\%$
Grounding	Negative
Operating temperature	$-20^{\circ}\text{C}$ to $+50^{\circ}\text{C}$
Current drain	0.45A in receive mode with no input signal 3.4A in HI transmit mode (Approx.) 1.4A in LOW transmit mode (Approx.) Less than 3 mA for memory back up (from power supply)
Dimensions	147.5 mm (5 - 13/16") wide 51.5 mm (2") high 193.0 mm (7 - 5/8") deep (projections excluded)
Weight	1.5 kg (3.3 lbs) (approx.)

##### TRANSMITTER SECTION

RF output power (at 13.8V DC, 50 $\Omega$ load)	HI 10 Watts min. LOW 1 Watts approx. (Adjustable)
Modulation	Variable reactance direct shift
Frequency tolerance ( $-20^{\circ}\text{C}$ ~ $+50^{\circ}\text{C}$ )	Less than $\pm 15 \times 10^{-6}$
Spurious radiation	HI Less than -60 dB LOW Less than -50 dB
Maximum frequency deviation (FM)	$\pm 5$ kHz
RPT. Tone frequency (W)	1.750 Hz
RPT. Tone burst frequency (T)	1.750 Hz
Microphone	Dynamic microphone with PTT, UP, DWN switches, 500 $\Omega$

##### RECEIVER SECTION

Circuitry	Double conversion superheterodyne
Intermediate frequency	1st IF 21.6 MHz 2nd IF 455 kHz
Receiver sensitivity	Better than 1 $\mu\text{V}$ for 30 dB S/N Better than 0.4 $\mu\text{V}$ for 12 dB SINAD
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Note: Circuit and ratings are subject to change without notice due to developments in technology

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## CIRCUIT DESCRIPTION

### < Receiver Section >

The front end consists of the RF unit, the 1st mixer and a 2-stage 21.6 MHz MCF (monolithic crystal filter); the RF unit consists of a 2-stage RF amplifier using a dual gate MOS FET Q1 (3SK76 or 3SK92), junction FET Q2 (2SK125), and helical resonators with a bandwidth of 10 MHz. The 1st mixer (Q1, located on the RX-TX unit) uses a 3SK48. The 21.6 MHz IF signal is applied to 2nd mixer Q3 (2SC1923 (O)) to obtain the 455 kHz 2nd IF signal. The 2nd IF signal is then applied to the 5-stage IF amplifier, Q5 ~ Q9 (2SC460 (B)), through a CFW455E ceramic filter. It is then detected to obtain an AF signal.

Item	Rating
Nominal center frequency	455 kHz
6 dB bandwidth	$\pm 7.5$ kHz or more
50 dB bandwidth	$\pm 15$ kHz or less
Ripple (within $455 \pm 5$ kHz)	3 dB or less
Loss	6 dB or less
Guaranteed attenuation (within $455 \pm 100$ kHz)	35 dB or more
Input and output impedance	1.5 k $\Omega$

Table 2 Ceramic filter (L72-0316-05) CFW445E  
(RX-TX unit: L7)

Item	Rating
Nominal center frequency ( $f_0$ )	21.6 MHz
3 dB bandwidth	$\pm 15$ kHz or more
Attenuation bandwidth	$\pm 50$ kHz or less at 40 dB $\pm 100$ kHz or less at 60 dB
Ripple	1.0 dB or less
Loss	1.5 dB or less
Guaranteed attenuation	70 dB or more within $f_0 \pm 1$ MHz
Spurious	25 dB or more within $f_0$ to $f_0 + 500$ kHz 80 dB or more within $f_0 - (910 \pm 20)$ kHz
Input and output impedance	1.5 k $\Omega$

Table 1 MCF (L71-0218-05)  
(RX-TX unit: L4)

The squelch circuit amplifies noise signals by Q12 and Q13 and then rectifies this by D11 and D12 to control switching transistors Q14-Q17, which turns AF amplifier Q10 and the BUSY indicator, on and off. The squelch circuit also supplies the scan stop signal to the microprocessor, IC7. The AF signal is amplified by Q10 (2SC1815 (Y)) and is then applied to power amplifier IC2 (HA1366W) through an active L.P.F., Q11 (2SC2603 (E)), and the AF GAIN control.

Item	Sym- bol	Condition ( $T_a = 25^\circ\text{C}$ )	Rating			Unit
			MIN	TYP	MAX	
DC current with no input	$I_a$	$V_{in} = 0$	—	30.0	60.0	mA
Gain in voltage	$G_v$	$V_{in} = -50$ dB	50.0	52.5	55.0	dB
Output power	$P_o$	THD = 10%	4.5	5.5	—	W
Distortion	THD	$P_o = 0.5$ W	—	—	1.5	%
Noise level	WBN	$R_g = 10$ k $\Omega$ , $BW = 20$ Hz ~ 20 kHz	—	—	2.0	mV
Hum ratio	HR	$f = 500$ Hz	28.0	—	—	dB
Voltage allowance with a shorted load		$f = 500$ Hz $V_{in} = 10$ mV, $t = 5$ sec.	16.0	—	—	V

Rank	1	2	3
$G_v$ (dB)	50.0 ~ 52.2	51.4 ~ 53.6	52.8 ~ 55.0

Table 3 HA1366W (RX-TX unit: IC2)

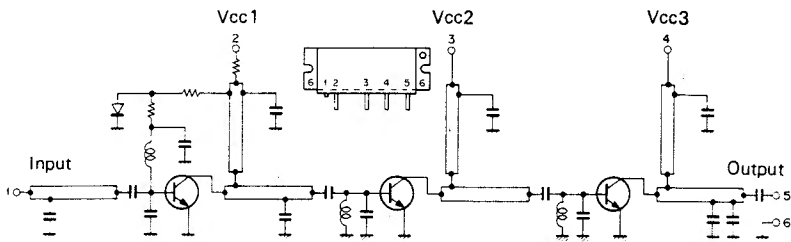


Fig. 1 Power module M57704M

### < Transmitter Section >

The microphone signal is amplified in the RX•TX unit by the microphone amplifier IC1 (TA7061AP) and is then applied to the VCO through D1 (1S2208) in the PLL unit. VCO Q1 (2SK125) in the PLL unit directly generates a 430 MHz signal. The 430 MHz signal is buffer amplified by Q2 (2SC2212) and Q3 (2SC2026) and is then amplified by Q29 (2SC2026) and Q30 (2SC2407) in the RX•TX unit. This signal is applied to the final power module M57704M where it is amplified and then fed to an antenna through the L.P.F. Power module M57704 provides excellent performance.

### < PLL Circuit >

The VCO circuit directly generates 408.400 — 418.375 MHz during reception and 430.000 — 439.975 MHz during transmission (418.400 — 428.374 MHz and 440.000 — 449.975 MHz for the K type model). This signal is buffer amplified by Q2 (2SC2212) and Q4 (3SK76 or 3SK92), and then mixed with the HET signal by a DBM consisting of D6 (ND487C2-3R), to obtain a 5.5 — 10.48 MHz IF signal. The IF signal is amplified by IC3 (TA7302P) and Q11 (2SC1923 (O)), and then frequency divided by IC4 (TC9122P) according to data from the microprocessor to obtain a 10 kHz reference signal. At the same time, the 10.24 MHz signal generated by IC2 (TC5082) is frequency divided to obtain a 10 kHz standard signal. Phase comparator IC1 (TC5081P) compares the 10 kHz reference signal with the standard signal. The comparator output signal is applied to varicap diode D3 (1SV50S) in the VCO circuit through a low-pass filter consisting of Q7 (2SK30A (Q)) and Q8 (2SC2240 (GR)) to control Q1, the Voltage Controlled Oscillator.

The HET signal applied to the DBM is generated by a 3rd-overtone oscillator, Q12 (2SC1923), and a tripler, Q13 (2SC2212).

### < Control Circuit >

Microprocessor IC7 is the same as that used in the model TR-9000 VHF transceiver.

The display unit uses a 4-digit LED. Three digits are lit by dynamic scanning, while the first digit and the decimal are preset.

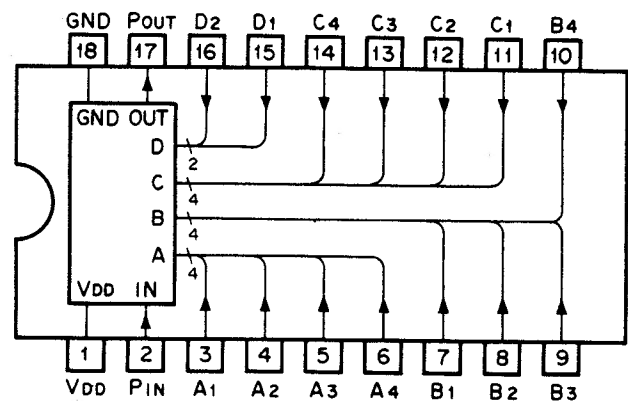
The microprocessor D-port output data (BCD code) (from pins 8 to 11) is converted into 7-segment data by decoder-driver IC6 (TC5022BP). The digit signals from the E-port (pins 13 to 15) switch Q20 — Q22 on sequentially so that each LED digit is scanned ON.

#### Max. rating M57704M

Item	Symbol	TC (°C)	Rating
Operating voltage	Vcc	25	17V
DC current	Icc	25	5A
Operating temperature	TC (op)		-30 ~ +110°C
Storage temperature	Tstg		-40 ~ +110°C

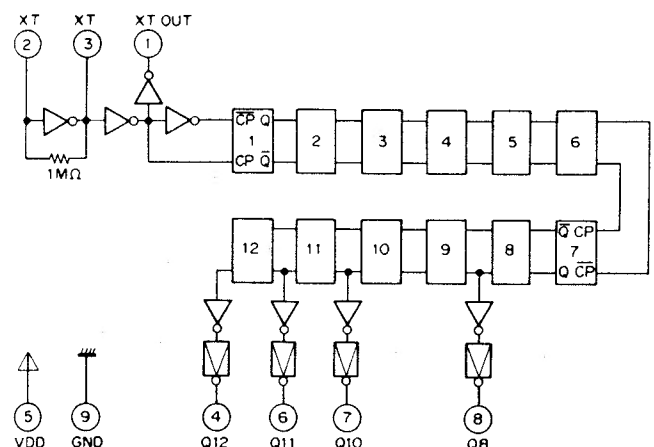
#### Electrical characteristic M57704M

Item	Symbol	TC (°C)	Condition	Value	
				Min.	Typ.
Output	Po	25	f = 430 ~ 450 MHz, Vcc = 12.5V Pin = 0.2W, ZG = ZL = 50Ω	13W	15W
Total efficiency	ηT	25		35%	40%



Symbol	Name	Content and operation	Remarks
Pin	Programmable counter input terminal	Programmable counter input terminal to which the signal to be divided is input	Build-in bias circuit
Pout	Programmable counter output terminal	Programmable counter output terminal. Output is 1/N of the input frequency. The output pulse width equals 5 bit of the input	
A <sub>1</sub> ~ A <sub>4</sub> B <sub>1</sub> ~ B <sub>4</sub> C <sub>1</sub> ~ C <sub>4</sub> D <sub>1</sub> ~ D <sub>4</sub>	Program input terminals	Terminal to set the dividing ratio. The following input combination is prohibited: A <sub>1</sub> A <sub>2</sub> A <sub>3</sub> A <sub>4</sub> B <sub>1</sub> B <sub>2</sub> B <sub>3</sub> B <sub>4</sub> C <sub>1</sub> C <sub>2</sub> C <sub>3</sub> C <sub>4</sub> D <sub>1</sub> D <sub>2</sub> 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Build-in pull-down resistor

Fig. 2 TC9122P (PLL unit: IC4)



PIN NO	8	7	6	4	1
PIN NAME	Q <sub>8</sub>	Q <sub>10</sub>	Q <sub>11</sub>	Q <sub>12</sub>	XT <sub>out</sub>
Dividing ratio	1/256	1/1024	1/2048	1/4096	1/1
Output frequency X-tal 10.24 MHz	40 kHz	10 kHz	5 kHz	2.5 kHz	10.24 MHz

Fig. 3 TC5082P (PLL unit: IC2)

## CIRCUIT DESCRIPTION

### ● Data output for PLL

1 MHz, 100 kHz and 10 kHz data signals for the PLL are output as BCD codes from the G—, H— and I— ports (pins 22 — 32) of IC7. When the frequency is 430 MHz (440 MHz for the K model type) or 435 MHz (445 MHz), the 3 digit BCD code output data is 550. When it is 434.975 MHz (444.975 MHz) or 439.975 MHz (449.975 MHz), the 3 digit BCD code output data is 1047.

### ● Reset circuit

When the MB (Memory Back-up) voltage for the microprocessor is within the ON-range of diode D26 (MA522 (W)) current flows into the base of Q19 (2SC1815

(Y)) and the collector level is "L". When the MB voltage drops below the ON-range, the collector level rises to "H" and a reset pulse signal is generated by the CR differentiating circuit to reset the microprocessor.

### ● Encoder input data and UP/DOWN data

The pulse signal from the mechanical encoder (50 steps/revolution) is applied to the Schmitt circuit IC101 (TC7404 UBP) to prevent chattering, then applied to the A-port (pins 33 — 36) of the microprocessor. The microprocessor counts the number of pulses and performs UP/DOWN operation.

For Service Manuals  
**MAURITRON SERVICES**  
 8 Cherry Tree Road, Chinnor  
 Oxfordshire, OX9 4QY.  
 Tel (01844) 351694  
 Fax (01844) 362554  
 email: mauritron@dia1.pipex.com

PLL unit (X50-1670-00)

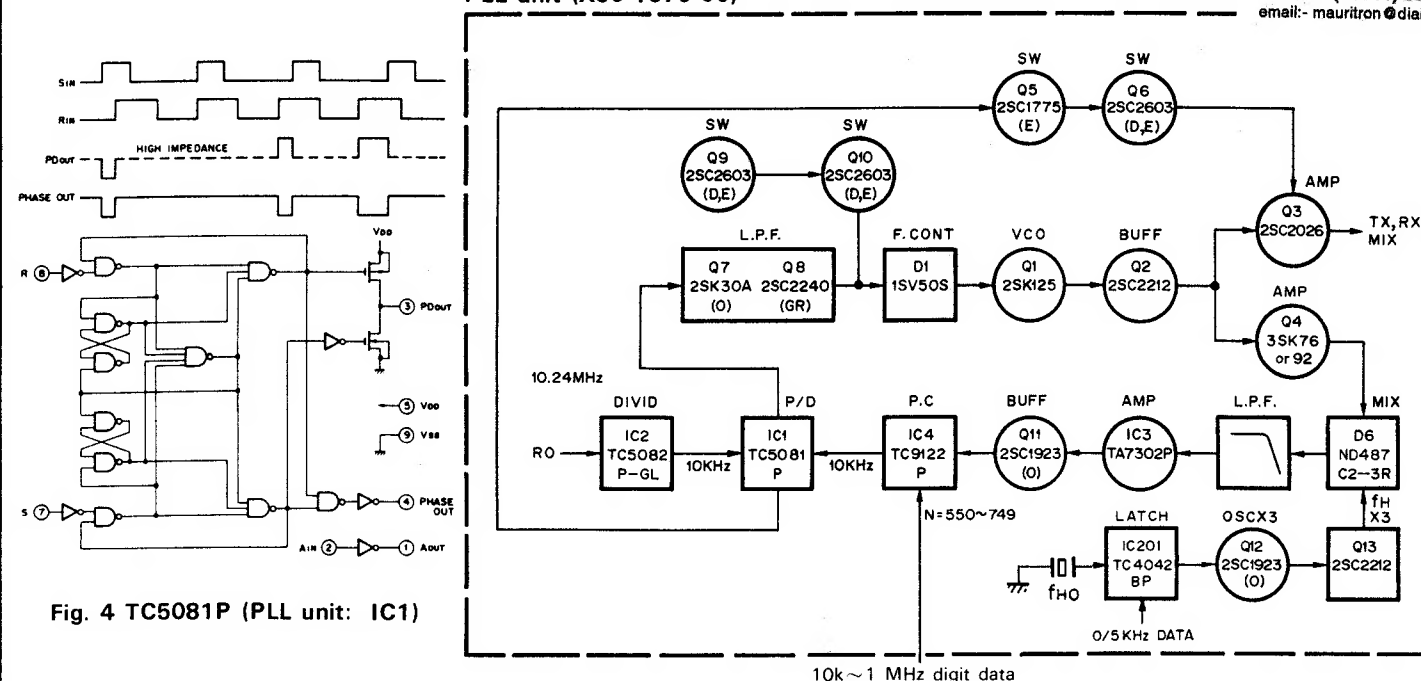


Fig. 4 TC5081P (PLL unit: IC1)

Fig. 5 PLL unit block diagram

### VCO FREQ.

TYPE	RX (MHz)	TX (MHz)
T.W.X	408.4~418.375	430.0~439.975
K	418.4~428.375	440.0~449.975

### HET OSC FREQ. fHO

	RX (MHz)	TX (MHz)	TX OFFSET (MHz)				
			-1.6	+1.6	-7.6	-5	+5
LOW BAND	44.7667 (W)(T)(X) 45.8778 (K)	47.1667 (W)(T)(X) 48.2778 (K)	46.9889 (W)(T)(X)	47.3444 (T)	—	—	48.8333 (K)
HIGH BAND	45.3222 (W)(T)(X) 46.4333 (K)	47.7222 (W)(T)(X) 48.8333 (K)	—	—	46.8778 (W)	47.1667 (X) 48.2778 (K)	—

### PLL HET FREQ. fH (fH = fHO × 9)

		RX (MHz)	TX (MHz)	TX OFFSET (MHz)				
				-1.6	+1.6	-7.6	-5	+5
0 kHz	LOW BAND	402.9 (W)(T)(X) 412.9 (K)	424.5 (W)(T)(X) 434.5 (K)	422.9 (W)(T)(X)	426.1 (W)(T)(X)	—	—	439.5 (K)
	HIGH BAND	407.9 (W)(T)(X) 417.9 (K)	429.5 (W)(T)(X) 439.5 (K)	—	—	421.9 (W)	424.5 (X) 434.5 (K)	—
5 kHz	LOW BAND	402.905 (W)(T)(X) 412.905 (K)	424.505 (W)(T)(X) 434.505 (K)	422.905 (W)(T)(X)	426.105 (W)(T)(X)	—	—	439.505 (K)
	HIGH BAND	407.905 (W)(T)(X) 417.905 (K)	429.505 (W)(T)(X) 439.505 (K)	—	—	421.905 (W)	424.505 (X) 434.505 (K)	—

# CIRCUIT DESCRIPTION

TR-8400

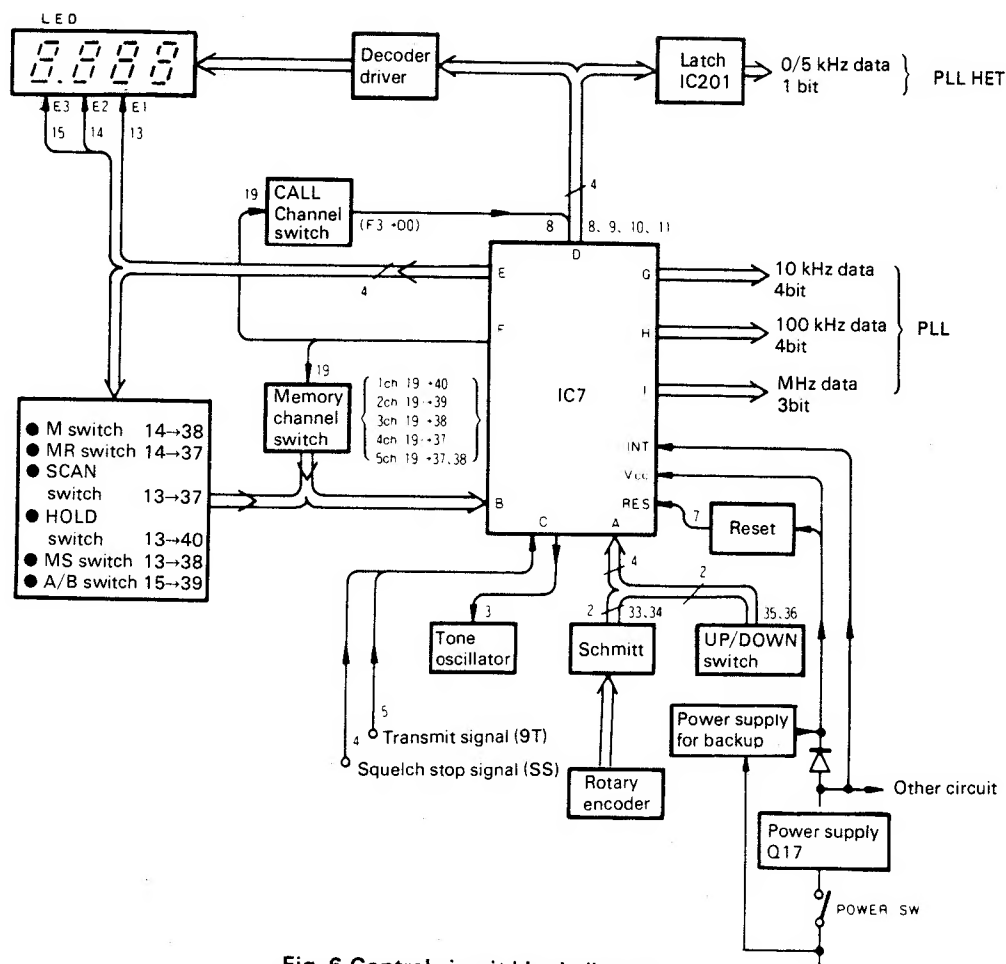


Fig. 6 Control circuit block diagram

Pin No.	Pin	Input signal	Output signal	Note	Pulse signal
1	CL0			Clock signal 400 kHz	
2	PC0	○		Normally "L"	
3	PC2	○		Normally "L", the buzzer sounds when "H".	
4	PC2	○		Squelch signal, BUSY stops when "H".	
5	PC3	○		Normally "L", "H" during transmission.	
6	INT	○		Normally "H"	
7	RES	○		Microprocessor is reset when "H".	
8	PD0	○	○	CALL CH signal is input. 0/5 kHz data signal is output. 1 MHz, 100 kHz, and 10 kHz data signals are output.	○
9	PD1		○		○
10	PD2		○		○
11	PD3		○		○
12	PE0			1 kHz data signal is output.	
13	PE1		○	10 kHz digit signal, SCAN, MS, HOLD, 10 or 1 MHz latch pulse signal is output.	○
14	PE2		○	100 kHz digit signal, M, MR, 430~434 band or 435~439 band latch pulse signal is output.	○
15	PE3		○	1 MHz digit signal or VFO A/B is output.	○
16	PF0			Not connected.	
17	PF1		○	10 MHz data for PLL or 435~439 data is output.	
18	PF2		○	1 MHz data for PLL or 430~434 data is output.	
19	PF3		○	Memory output signal	○

Pin No.	Pin	Input signal	Output signal	Note	Pulse signal
20	TEST			Normally 5V	
21	VCC			5V power supply	
22	PG0		○	Level at 430.00 MHz	
23	PG1		○		L
24	PG2		○		L
25	PG3		○		L
26	PH0		○	100 kHz data signals for PLL	H
27	PH1		○		L
28	PH2		○		H
29	PH3		○		L
30	PI0		○	1 MHz data signals for PLL	H
31	PI1		○		L
32	PI2		○		H
33	PA0	○		Encoder signal (clock)	
34	PA1	○		Encoder signal (UP/DOWN)	
35	PA2	○		Normally "H", "L" when microphone UP switch is pressed.	
36	PA3	○		Normally "H", "L" when microphone DOWN switch is pressed.	
37	PB0	○		MR, SCAN, Memory CH4 or 5 pulse signal is input.	○
38	PB1	○		M, MS, Memory CH3 or 5 pulse signal is input.	○
39	PB2	○		VFO-B or memory CH2 pulse signal is input.	○
40	PB3	○		Memory CH1 pulse signal is input.	○
41	VSS			Ground	
42	CL0			400 kHz clock signal	

Table 5 Microprocessor functions (μPD 650C-100 PLL Unit, IC7)

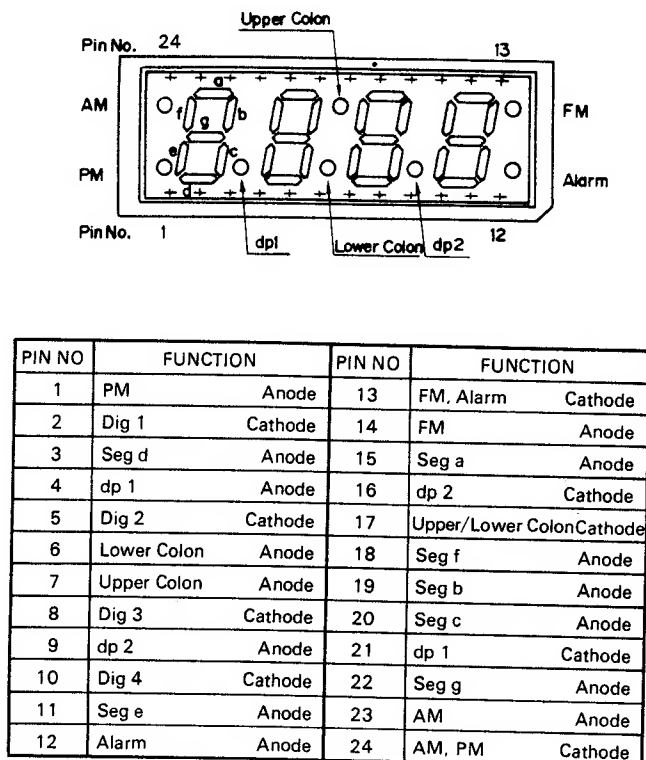


Fig. 7 LED LN543 RK (DISPLAY unit: D1)

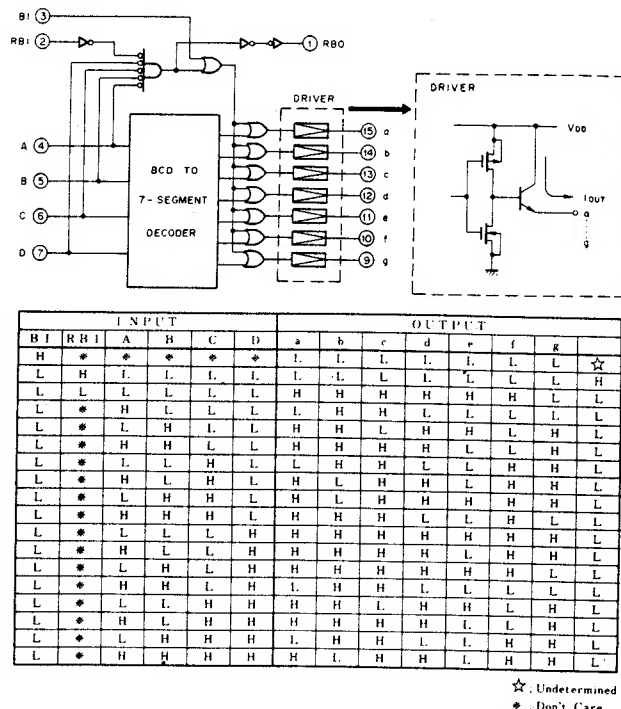


Fig. 8 TC5022BP (PLL unit: IC6)

## ● Scanning circuit

This circuit operates when SCAN switch S104 is pressed. Scanning operation is completely controlled by the microprocessor. The circuit continues to operate until HOLD switch S103 is pressed or the 9T (transmission signal line) is set to "H". Scanning operation is suspended while the squelch stop signal (at terminal SS) is "H". Frequencies stored in all memory channels, can be scanned by pressing MS switch S105. Scanning operation stops when the level at terminal SS becomes "H" or the 9T line is set to "H". However, after these signals return to "L" scanning operation resumes.

## ● Control circuit power supply

In the power supply circuit, Q15 (2SC496 (Y)) outputs 6V for the display and Q14 (2SC1959 (Y)) outputs 6.6V for the microprocessor through a reverse current protection diode, D14.

## < LED Meter Circuit (Display Unit X54-1520-00) >

Voltage appearing at the M terminal is applied to the LED meter driver IC1 (TA7612AP) so that an appropriate number of LEDs are lit according to the input voltage level.

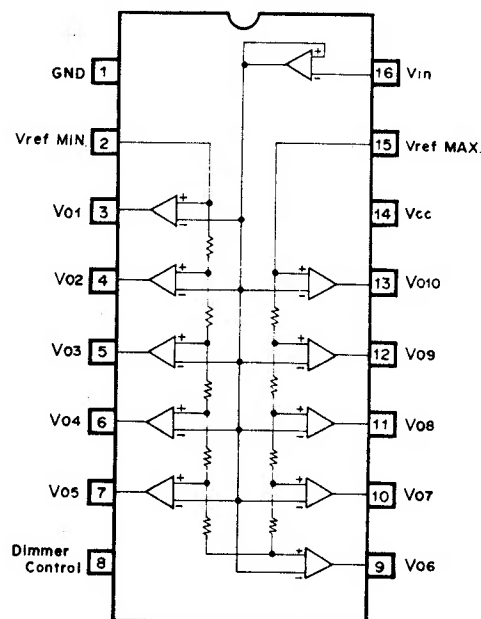
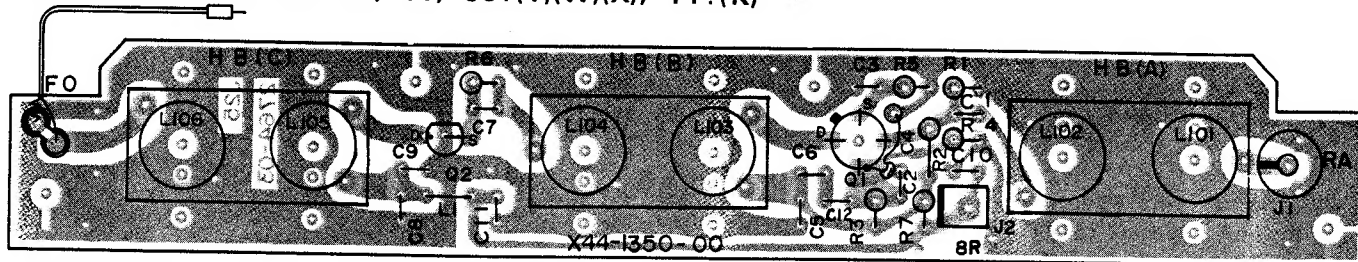


Fig. 9 TA7612AP (DISPLAY unit: IC1)

## PC BOARD VIEWS

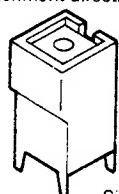
## ▼ RF Unit (X44-1350-00, 11) 00:(T)(W)(X), 11:(K)



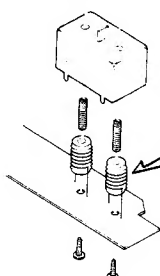
&lt; Attachment direction of J2 &gt;

&lt; Helical block (A)(B)(C) assembly &gt;

Q1: 3SK76 or 3SK92 Q2: 2SK125



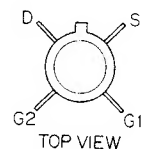
Silk screen printing



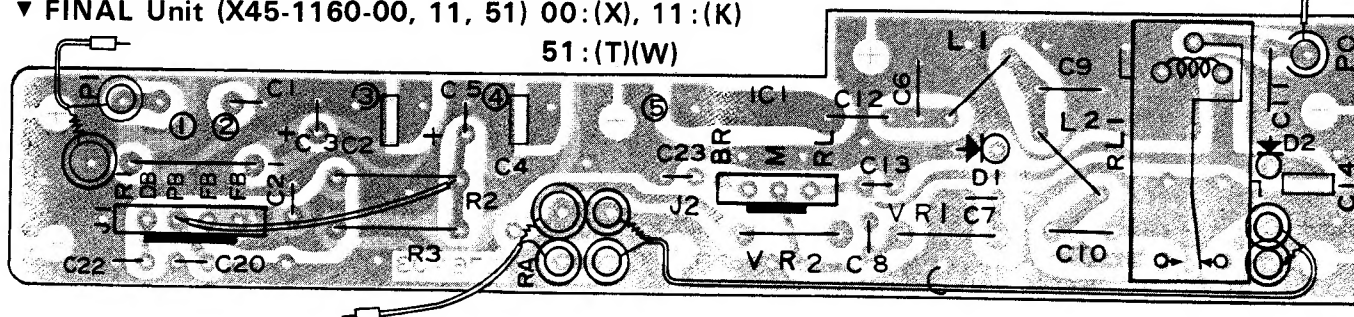
L101: Red  
L102: Black  
L103: Blue  
L104: Red  
L105: Green  
L106: Yellow



2SK125

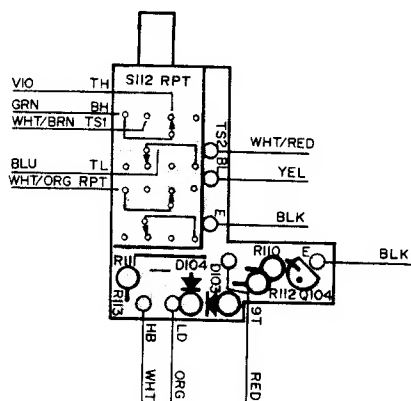
3SK76  
3SK92

TOP VIEW

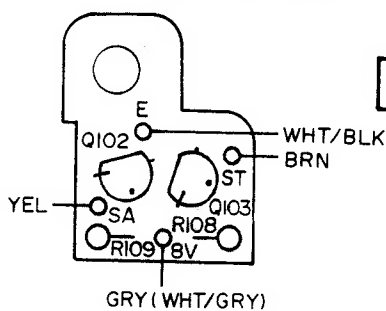
▼ FINAL Unit (X45-1160-00, 11, 51) 00:(X), 11:(K)  
51:(T)(W)

D1: 1SS16 D2: 1S1555

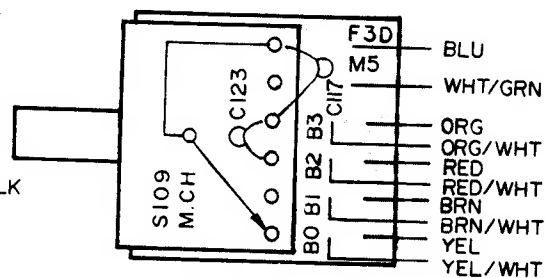
## ▼ RPT (J25-2799-04) (W) type



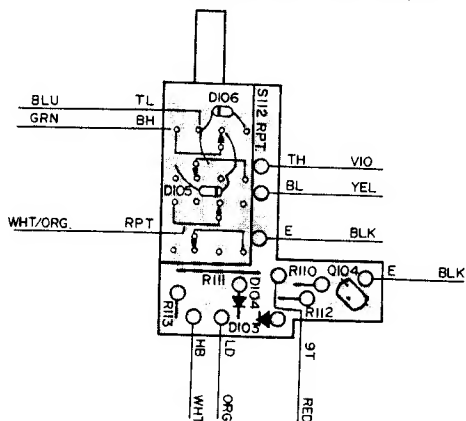
## ▼ STBY (J25-3001-04)



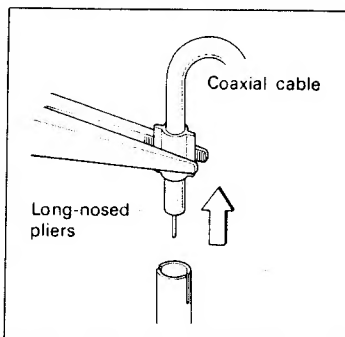
## ▼ Memory CH. (J25-2715-04)



## ▼ RPT (J25-2799-04) (K) type

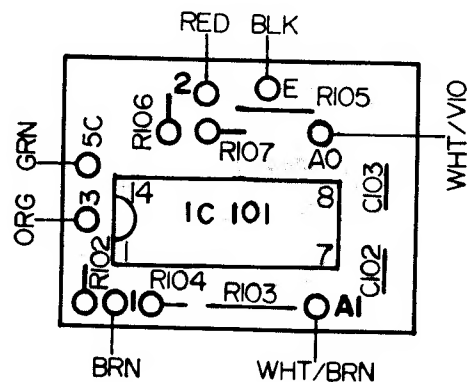


&lt; Disconnecting the coaxial cable &gt;



Hold the crimped metal sleeve with pliers and pull up as shown.  
Caution: DO NOT pull on the cable.

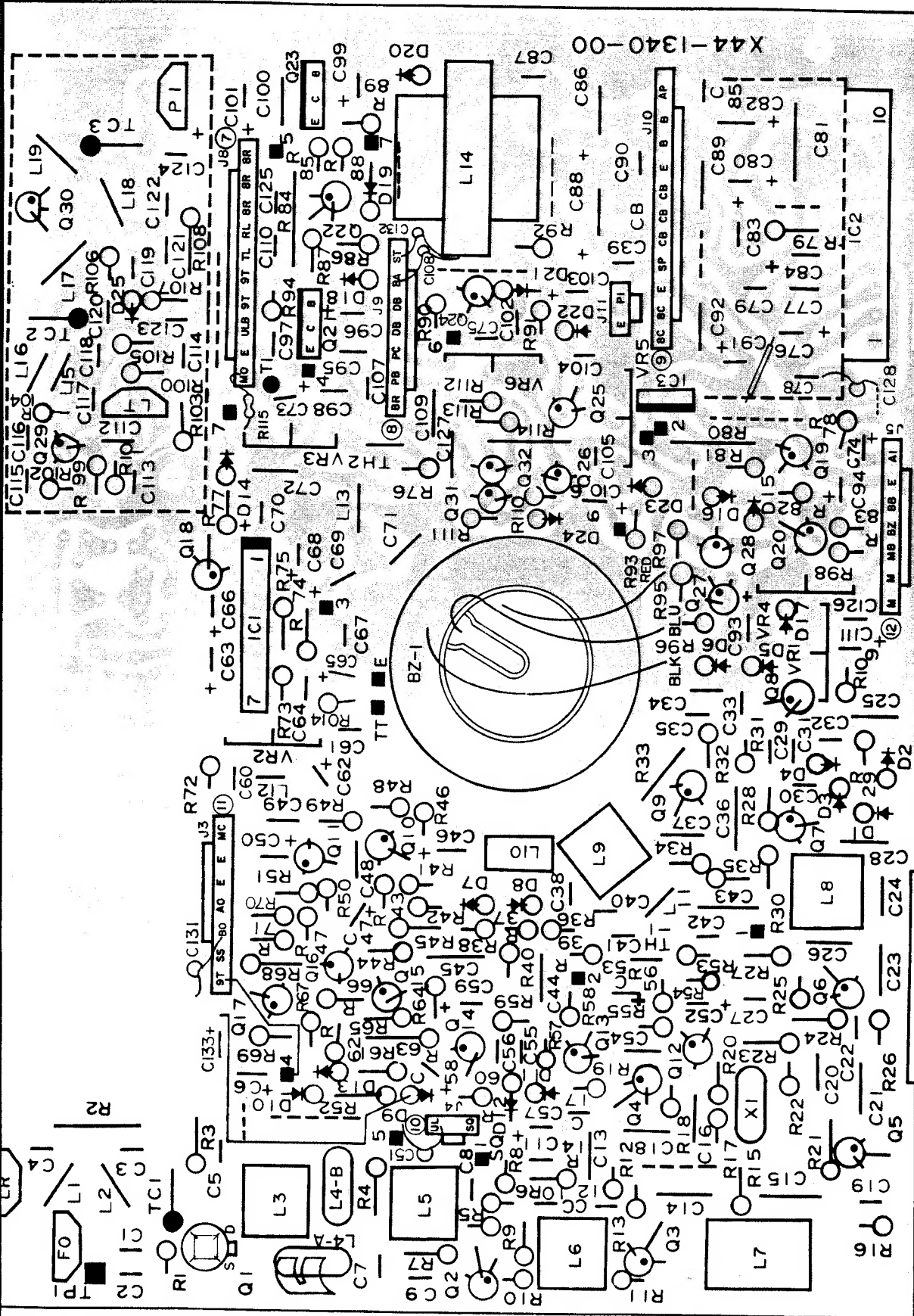
## ▼ Schmitt (J25-2755-14)



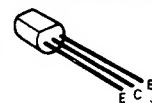


# PC BOARD VIEW

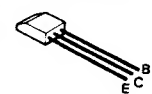
▼ RX-TX Unit (X44-1340-11) (K)(X)



2SA1015(Y)  
2SC1815(Y)  
2SC1923(O)  
2SC1959(Y)



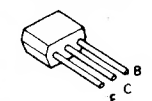
2SC460(B)



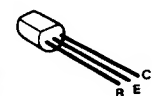
2SC496(Y)



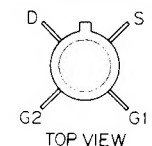
2SA1115(E)  
2SC2603(E)



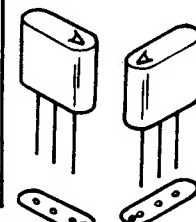
2SC2026  
2SC2407



3SK48



TOP VIEW

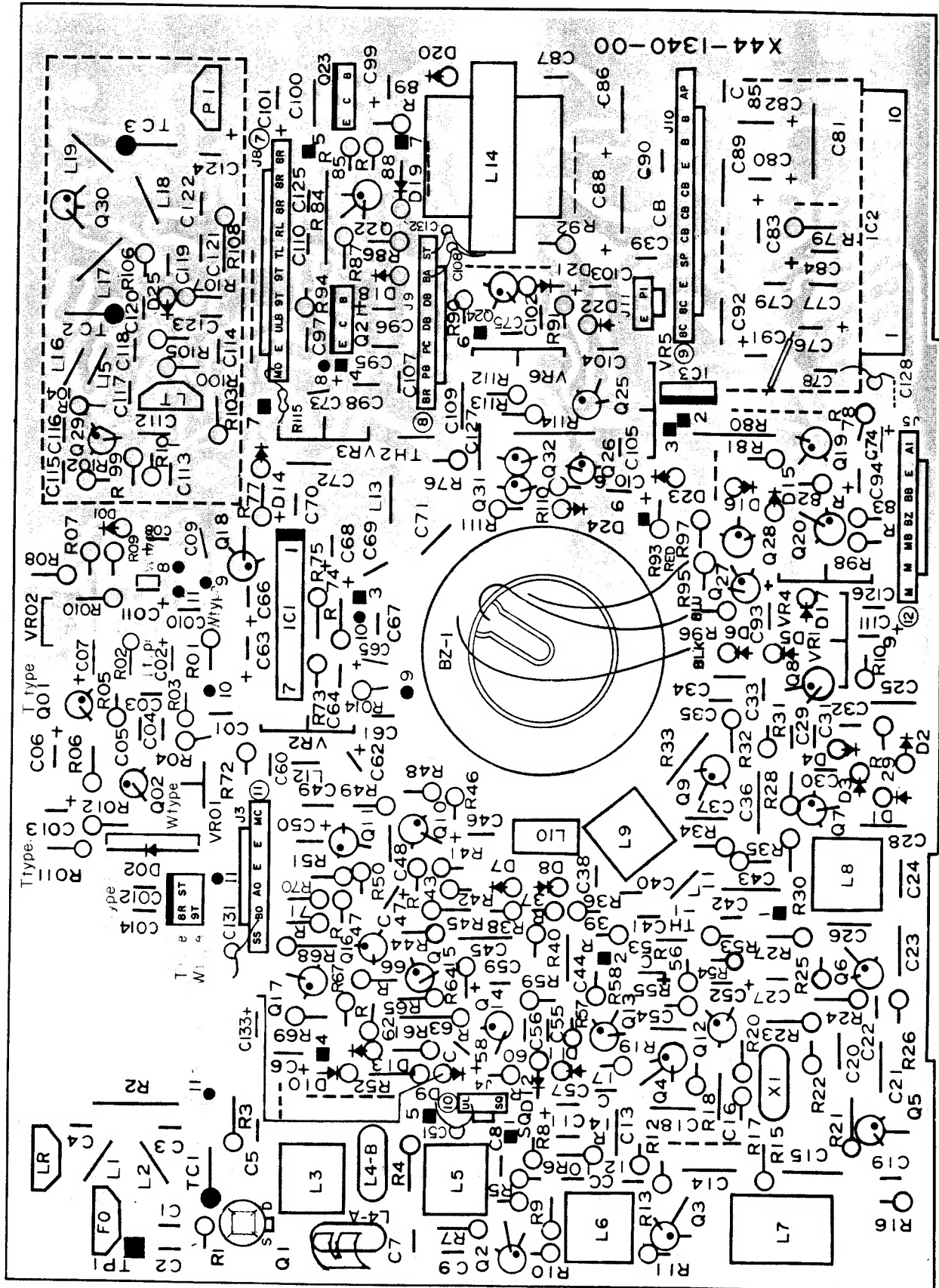


< Attachment direction  
of L4 >  
(L4 should be used as  
a pair.)

Q1: 3SK48 Q2,3: 2SC1923 (O) Q4~9: 2SC460 (B) Q10,12,13,19,20,27,28: 2SC1815 (Y) Q11,14~16,18,26: 2SC2603 (E)  
Q17,31,32: 2SA1115 (E) Q21,23: 2SC496 (Y) Q22,25: 2SA1015 (Y) Q24: 2SC1959 (Y) Q29: 2SC2026 Q30: 2SC2407  
IC1: TA7061AP IC2: HA13066W IC3:  $\mu$ PC78L08A  
D1,2,11,12: 1N60 D3~6,9,10,15,19,21,23~25: 1S1555 D7,8: 1SS16 D13: 1S1212 D14: WZ-040 D16: XZ-066  
D17: XZ-070 D18: WZ-100 D20: XZ-094 D22: XZ-060 TH-1,2: D33A



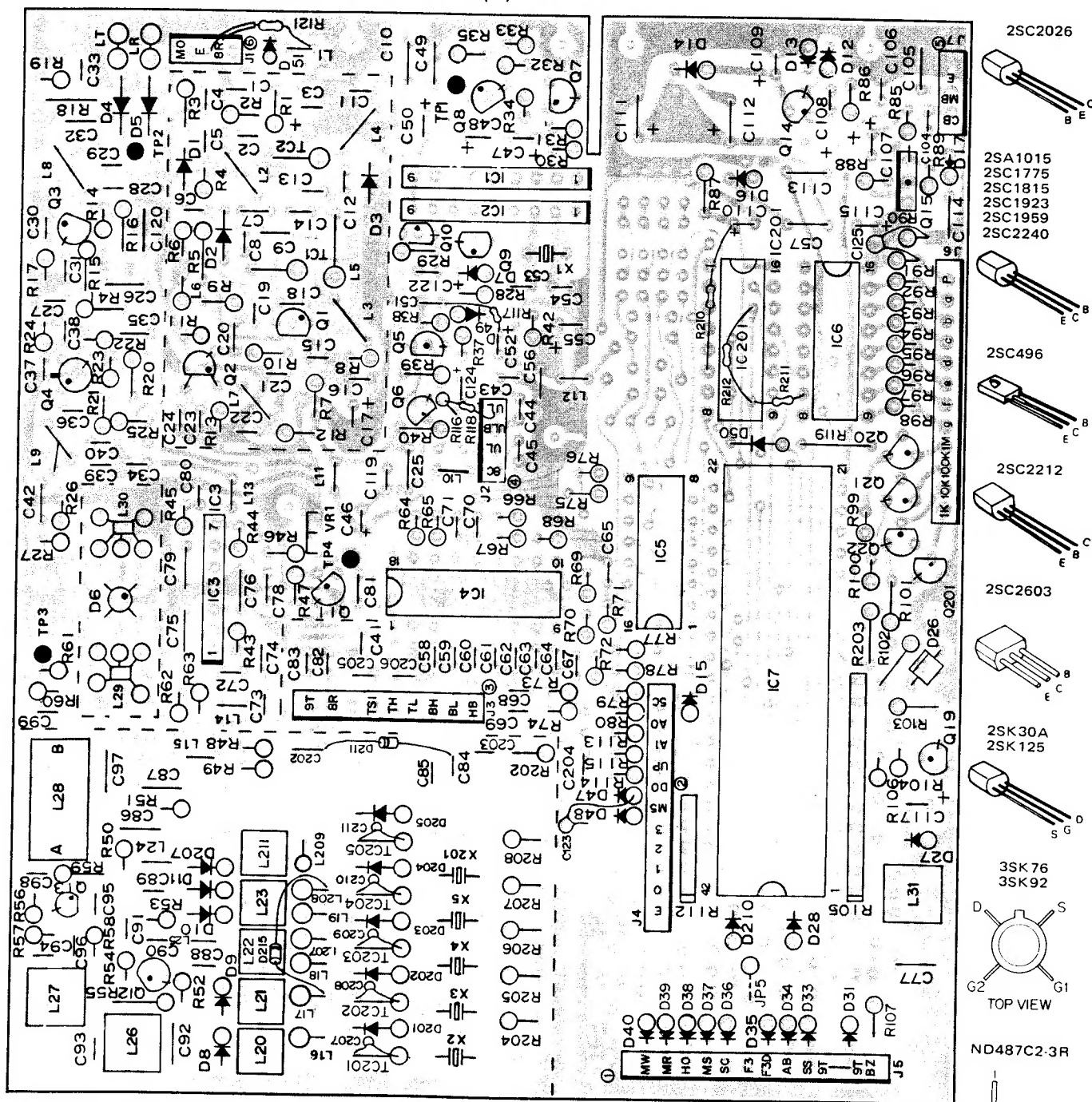
▼ RX-TX unit (X44-1340-51, 61) 51:(W), 61:(T)



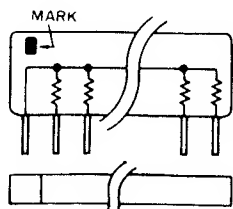
Q1: 3SK48 Q2,3: 2SC1923 (O) Q4~9: 2SC460 (B) Q10,12,13,19,20,27,28: 2SC1815 (Y) Q11,14~16,18,26: 2SC2603 (E)  
 Q17,31,32: 2SA1115 (E) Q21,23: 2SC496 (Y) Q22,25: 2SA1015 (Y) Q24: 2SC1959 (Y) Q29: 2SC2026 Q30: 2SC2407  
 Q01,02: 2SC458 (B)  
 IC1: TA7061AP IC2: HA13066W IC3: μPC78L08A  
 D1,2,11,12: 1N60 D3~6,9,10,15,19,21,23~25,01,02: 1S1555 D7,8: 1SS16 D13: 1S1212 D14: WZ-040 D16: XZ-066  
 D17: XZ-070 D18: WZ-100 D20: XZ-094 D22: XZ-060 TH-1,2: D33A

# PC BOARD VIEW

▼ PLL Unit (X50-1670-11, 71) 11:(K), 71:(X)

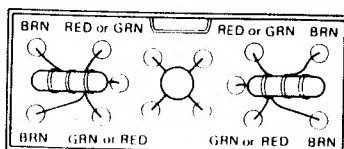


Q1: 2SK125 Q2,13: 2SC2212 Q3: 2SC2026 Q4: 3SK76 or 3SK92 Q5: 2SC1775 (E) Q6,9,10: 2SC2603 (D) or (E)  
 Q7: 2SK30A (O) Q8: 2SC2240 (GR) Q11,12: 2SC1923 (O) Q14,20~22,201: 2SC1959 (Y) Q15: 2SC496 (Y)  
 Q19: 2SC1815 (Y)  
 IC1: TC5081P IC2: TC5082P-L IC3: TA7302P IC4: TC9122P IC5: MN1201A IC6: TC50228P IC7:  $\mu$ PD650-C-100  
 IC201: TC40428P  
 D1: 1S2208 D2: MI301 D3: 1SV50S D4,5: 8A243S D6: ND487C2-3R D7: XZ-062 D8~11,207,208: 8A244A  
 D12,14~16,27,31,51,211,212,215,216: 1S1555 D13,17: XZ-066 D26: MA-522 (Q) D28,33~40,47~50,210: 1N60  
 D201~206: 1S2588



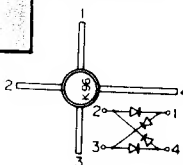
Attachment direction of R105, R102

L29 and L30 should be installed parallel to the surface of the shield case.



Front panel

X201  
 R208  
 D205  
 D211  
 D215  
 C202  
 C211  
 L209  
 L211  
 TC205  
 (X) type only

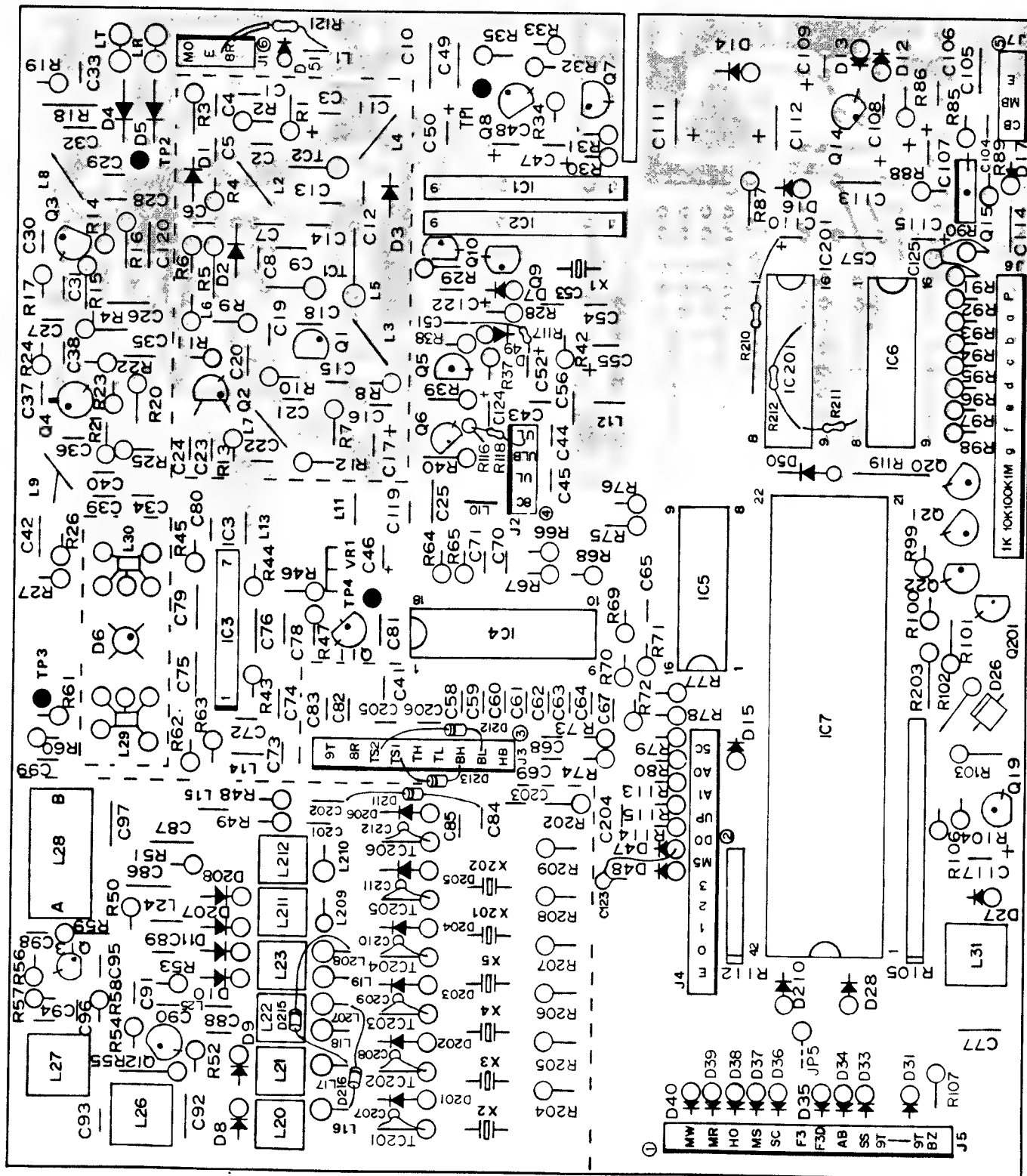


Attachment direction of L5

# PC BOARD VIEW

TR-8400

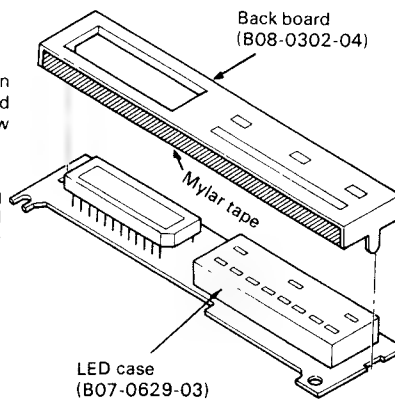
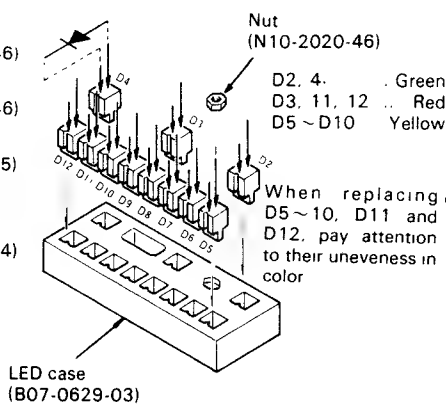
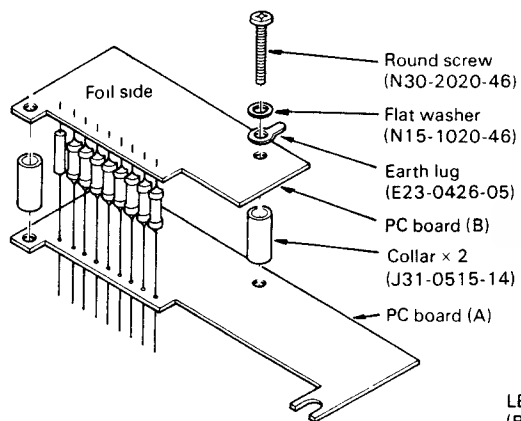
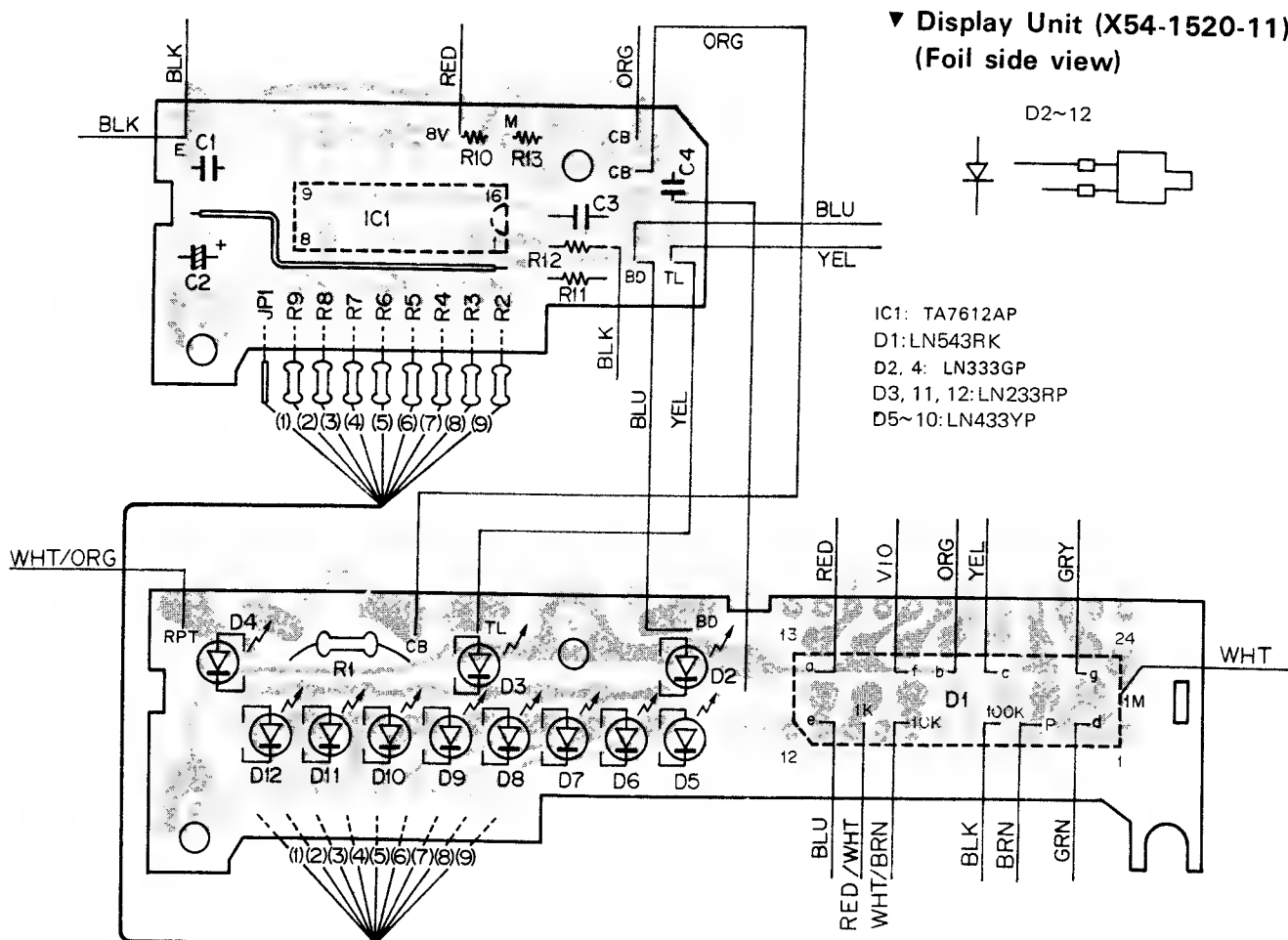
▼ PLL unit (X50-1670-51, 61) 51:(T), 61(W)



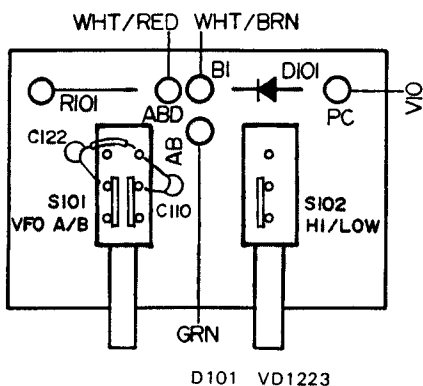
Q1 2SK125 Q2.13 2SC2212 Q3 2SC2026 Q4 3SK76 or 3SK92 Q5 2SC1775 (E) Q6.9.10 2SC2603 (D) or (E)  
 Q7 2SK30A (O) Q8 2SC2240 (GR) Q11.12 2SC1923 (O) Q14.20~22.201 2SC1959 (Y) Q15 2SC496 (Y)  
 Q19 2SC1815 (Y)  
 IC1 TC5081P IC2 TC5082P-L IC3 TA7302P IC4 TC9122P IC5 MN1201A IC6 TC5022BP IC7  $\mu$ PD650-C-100  
 IC201 TC4042BP  
 D1 1S2208 D2 MI301 D3 1SV50S D4.5 BA243S D6 ND487C2-3R D7 XZ-062 D8~11.207.208 BA244A  
 D12.14~16.27.31.51.211.212.215.216 1S1555 D13.17 XZ-066 D26 MA-522 (Q) D28.33~40.47~50.210 1N60  
 D201~206 1S2588

Type	W Type	T Type
D213	Used	Not used

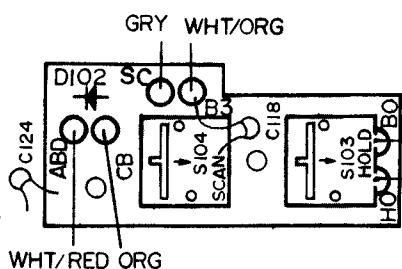
# PC BOARD VIEWS



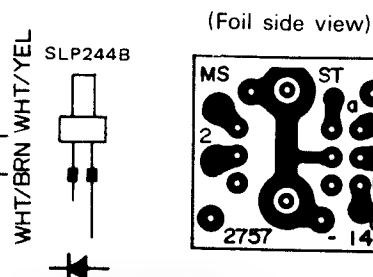
## ▼ VFO A/B HI/LOW (J25-2756-04)



## ▼ SCAN, HOLD (J25-2758-14)



## ▼ TONE (W), M, MR/M. SCAN (J25-2757-14)



# PARTS LIST

TR-8400

## Note 1.

K U.S.A. T Britain W Europe X Australia

## Note 2:

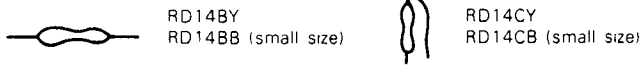
Only special type of resistors (example cement, metal film, etc.) and capacitors (example electrolytic, tantalum, mylar, temp. coeff. capacitors) are detailed in the PARTS LIST. For the value of all common type components, refer to the schematic diagram of the P.C. board illustration. Resistors not otherwise detailed are carbon type (1/4W or 1/8W). Order carbon resistors and capacitors according to the following example.

A carbon resistor's part number is RD14BY 2E222J

A ceramic capacitor's number is CK45F1H103Z, CC45TH1H220J

## RESISTOR

### 1 Type of the carbon resistor



### 2 Wattage

1W → 3A 3W → 3F 5W → 3H  
2W → 3D 4W → 3G

### 3' = CC45 ○ ○ ...

Ceramic capacitor (type I) temperature coeff. capacitor 1' 3'

1st word (Color)	C (Black)	L (Red)	P (Orange)	R (Yellow)	S (Green)	T (Blue)	U (Violet)
ppm/°C	0	-80	-150	-220	-330	-470	-750

### 3 = CK45 ○

Ceramic capacitor (type II) 3

Cord	B	D	E	F
Operating temperature C	-30 +85	-30 +85	-30 +85	-10 +70

### 6 = Tolerance

Cord	C	D	G	J	K	M	X	Z	P	No cord
(%)	±0.25	±0.5	±2	±5	±10	±20	+40 -20	+80 -20	+100 -0	More than 10 μF -10 ~ +50 Less than 4.7 μF -10 ~ +75

### Less than 10 pF

Cord	B	C	D	F	G
(pF)	+0.1	+0.25	±0.5	±1	±2

Abbreviation		Abbreviation	
Cap	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

## TR-8400 Semiconductor

Item	Name	Parts No.	Remarks
Diode	1N60	V11-0051-05	
	1S1555	V11-0076-05	
	1SS16	V11-0374-05	
	1S2588	V11-0414-05	
	BA243S	V11-7767-06	☆
	BA244A	V11-7776-66	
	MA-522(Q)	V11-1173-46	
	MI-301	V11-0255-05	
	U05B	V11-0270-05	
	1S1212	V11-1262-06	
Varistor	VD1223	V11-1262-46	
	1S2208	V11-0317-05	
Vari-cap	1SV50S	V11-1260-36	
diode	D33A	V11-3161-86	
Thermistor			
Double bal- anced diode	ND487C2-3R	V11-1266-06	☆
Zener diode	WZ-040	V11-4102-50	
	XZ-060	V11-4101-20	
	XZ-062	V11-4101-50	

## 3 Resistance value

② ② ② → means  $22 \times 10^2 = 2200\Omega$  (2.2 kΩ)  
Example 221 → 220Ω 223 → 22 kΩ 225 → 2.2 MΩ  
222 → 2.2 kΩ 224 → 220 kΩ

## 4 Tolerance

J = ±5% (Gold) K = ±10% (Silver)

## CAPACITORS

### Type I

CC 45 TH 1H 220 J CK 45 F 1H 103 Z  
1' 2 3' 4 5 6 1 2 3 4 5 6  
1 = Type ceramic, electrolytic, etc 4 = Voltage rating  
2 = Shape round, square, etc 5 = Value  
3 = Temp range 6 = Tolerance  
3' = Temp coefficient

### Type II

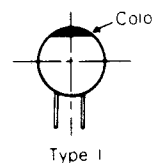
Ex CC45TH = -470 ±60 ppm/°C

2nd Word	G	H	J	K	L
ppm/°C	±30	±60	±120	±250	±500

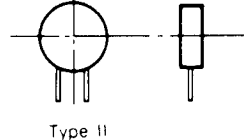
## 5 = Capacitor value

Example 010 → 1 pF  
100 → 10 pF  
101 → 100 pF  
102 → 1000 pF = 0.001 μF  
103 → 0.01 μF

## CC45



## CK45



● New parts

● Accessory parts

Item	Name	Parts No.	Remarks
LED	XZ-066	V11-4106-70	
	XZ-070	V11-4161-96	
	XZ-094	V11-4173-26	
	WZ-100	V11-0247-05	
	LN233RP	V11-1173-06	Red ☆
	LN333GR	V11-1173-16	Green ☆
	LN433YP	V11-1173-26	Amber ☆
	LN543RK	V11-1173-36	4 Digit ☆
	SLP244B	V11-6172-66	
TR	2SA671(B)	V01-0671-16	
	2SA1115(E)	V01-1115-16	
	2SA1015(Y)	V01-1015-06	
	2SC458(B)	V03-0093-05	
	2SC460(B)	V03-0079-05	
	2SC496(Y)	V03-0336-05	
	2SC1775(E)	V03-1775-06	
	2SC1815(Y)	V03-1815-06	
	2SC1923(O)	V03-1923-06	
	2SC1959(Y)	V03-1959-06	

## PARTS LIST

Item	Name	Parts No.	Remarks
FET	2SC2026	V03-2026-06	
	2SC2212	V03-2212-06	
	2SC2240(GR)	V03-2240-06	
	2SC2407	V03-2407-06	
	2SC2603(E)	V03-2603-06	
	2SK30A(O)	V09-0056-05	
	2SK125	V09-0136-10	
	3SK48	V09-1003-16	
	3SK76	V09-1012-06	
	3SK92	V09-1006-16	
IC	FS7808C	V30-1135-06	
	HA1366W	V30-1045-06	
	M57704M	V30-1168-06	
	M57704M-1	V30-1168-06	
	MN1201A	V30-1008-66	
	TA7061AP	V30-0039-05	
	TA7302P	V30-1134-06	
	TA7612AP	V30-1169-06	
	TC4042BP	V30-1052-06	☆
	TC5022BP	V30-1054-06	☆
	TC5081P	V30-1132-06	
	TC5082P-GL	V30-1147-06	
	TC5082P-L	V30-1133-06	
	TC7404UBP	V30-1028-06	
	TC9122P	V30-1036-16	
	μPD650C-100	V30-1228-16	
	μPC78L08A	V30-1030-26	
	μPC78M08H	V30-1222-16	
			(T)(W)(X)
			(T)(W)(X)
			(K) ☆
			☆
			☆
			☆
			☆
			☆

## TR-8400

 ☆ : New parts  
 ● : Accessory parts

Ref. No.	Parts No.	Description	Re- marks
	A01-0774-12	Case (upper)	☆
	A01-0775-22	Case (lower)	☆
	A13-0618-22	Angle ass'y	☆
	A20-2394-04	Panel (T)(W)(X)	☆
	A20-2418-04	Panel (K)	☆
	B01-0630-03	Panel escutcheon (K)	☆
	B01-0631-03	Panel escutcheon (T)	☆
	B01-0632-03	Panel escutcheon (W)(X)	☆
	B03-0517-04	Switch mask (B) × 2 M.MR	☆
	B03-0518-04	Switch mask × 4 A/B, H/L, MS, TONE	☆
	B05-0714-04	SP grill cloth	☆
	B07-0628-14	Side escutcheon × 2	☆
	B10-0629-04	Front glass	☆
	B46-0058-10	Warranty card (K)	☆
	B50-2766-00	Operating manual (K)	☆
	B50-2767-00	Operating manual (T)	☆
	B50-2768-00	Operating manual (W)	☆
	B50-2769-00	Operating manual (X)	☆
C102.103	C91-0430-05	Laminated cap. 0.047μF	
C104~109	C91-0469-05	Cap. 0.001μF	
C110~114	CC45SL1H470J	C 47pF	
C115.116	CC45SL1H330J	C 33pF	
C117.118	CC45SL1H470J	C 47pF	
121~123	CC45SL1H101J	C 100pF	
C124			
	E06-0651-05	6P male socket MIC	
	E09-0471-05	4P plug TONE PAD (K)	●
	E12-0001-05	Phone plug	●
	E23-0426-05	Earth lug φ2.0	
	E23-0427-05	Earth lug φ2.6	☆
	E30-1648-05	DC cord ass'y	●

Ref. No.	Parts No.	Description	Re- marks
	F05-4022-05	Fuse 4A	
	F20-0078-05	Insulating plate (Q101)	
	F29-0014-05	Shoulder washer (Q101)	
	G02-0520-04	GND spring	☆
	G02-0521-04	GND spring (D)	☆
	G02-0522-04	GND spring (E)	☆
	G02-0523-14	GND spring (F)	☆
	G10-0607-04	Cushion cloth × 4 side escutcheon	
	G10-0610-04	Cushion cloth × 4 A 17 × 5	
	G10-0611-04	Cushion cloth B 30 × 13	
	G10-0612-04	Cushion cloth C 150 × 45	
	G10-0613-14	Cushion cloth D 140 × 24	
	G13-0638-04	Cushion (A) × 2 58 × 24 × 5	
	G16-0504-03	Conductive rubber sheet	☆
	H01-2700-03	Carton (inside) (K)(W)(X)	☆
	H01-2701-03	Carton (inside) (T)	☆
	H10-2535-12	Packing fixture (A)	☆
	H10-2536-04	Packing fixture (B)	☆
	H12-0474-04	Cushion	☆
	H20-1417-03	Protective bag	☆
	H25-0029-04	Protective bag	
	H25-0049-03	Accessory bag	
	H25-0079-04	Protective bag MIC	
	H25-0103-04	Protective bag Cord	
	J02-0022-05	Foot × 2	●
	J02-0420-04	Foot	☆ ●
	J21-2676-04	Foot mounting hard ware × 2	☆ ●
	J25-2715-04	PC board Memory CH	
	J25-2755-14	PC board (A) Schmitt	☆
	J25-2756-04	PC board (B) A/B	☆
	J25-2757-14	PC board (C) M MR, M.SCAN	☆
	J25-2758-14	PC board (D) SCAN.HOLD	☆
	J25-2799-04	PC board (E) RPT	☆
	J25-3001-04	PC board (F)	☆
	J30-0514-04	LED spacer	☆
	J32-0747-04	Round boss × 2	☆
	J32-0748-04	Flat washer (angle) × 4	☆
	K21-0752-03	Main knob	☆
	K23-0736-04	Knob (A) × 2 VOL.SQU	☆
	K23-0737-04	Knob (B) M.CH	☆
	K23-0743-04	Knob (C) RPT	☆
	K27-0416-05	Push knob (A) M	☆
	K27-0417-05	Push knob (B) MR	☆
	K27-0418-05	Push knob (C) × 3 A/B, H/L, TONE	☆
	K27-0419-05	Push knob (D) MS	☆
	K27-0420-04	Push knob (E) × 2 SCAN, HOLD	☆
	N09-0008-04	Round screw (Angle)	●
	N13-0302-04	Ornamental nut M.CH	☆
	N14-0510-04	Flange nut	●
	N14-0512-05	Speed nut	
	N15-1020-46	Flat washer	●
	N15-1060-46	Flat washer	●
	N16-0060-46	Spring washer	●
	N30-2004-46	Round screw	
	N30-2020-46	Round screw	
	N30-2604-11	Round screw	
	N30-2606-71	Round screw	
	N30-3004-46	Round screw	
	N30-3008-11	Round screw	
	N32-2604-46	Flat screw	
	N32-2606-11	Flat screw	
	N33-2605-45	Round flat screw	
	N33-2606-45	Round flat screw	
	N33-2608-45	Round flat screw	

# PARTS LIST

TR-84C

Ref. No.	Parts No.	Description	Re- marks
VR101 VR102	N35-3006-45	Bind screw	●
	N35-3012-45	Bind screw	●
	R05-3410-05	Pot. 10k $\Omega$ (A)with SW VOL	☆
	R05-4405-05	Pot. 50k $\Omega$ (B) SQU	☆
	S01-1422-05	Rotary switch M.CH	☆
	S01-2427-05	Rotary switch RPT	☆
	S40-1401-05	Push switch $\times$ 2 H/L, MS	☆
	S40-1402-05	Push switch $\times$ 2 M	☆
	S40-2417-05	Push switch $\times$ 3 A/B, MR, TONE	☆
	S40-2421-05	Push switch TONE (W)	☆
	S50-1406-05	Tact switch $\times$ 2 MIC	☆
	S59-1405-05	Key board switch $\times$ 2 SCAN, HOLD	☆
	T07-0209-15	Speaker	☆
	T91-0311-05	Microphone TRIO (T)	☆
	T91-0313-05	Microphone KENWOOD (K)(W)(X)	☆
	W02-0316-05	Rotary encoder	☆
	X44-1340-11	RX.TX unit (K)(X)	☆
	X44-1340-51	RX.TX unit (T)	☆
	X44-1340-61	RX.TX unit (W)	☆
	X44-1350-00	RF unit (T)(W)(X)	☆
	X44-1350-11	RF unit (K)	☆
	X45-1160-00	Final unit (X)	☆
	X45-1160-11	Final unit (K)	☆
	X45-1160-51	Final unit (T)(W)	☆
	X50-1670-11	PLL unit (K)	☆
	X50-1670-51	PLL unit (T)	☆
	X50-1670-61	PLL unit (W)	☆
	X50-1670-71	PLL unit (X)	☆
	X54-1520-11	Display unit	☆

## RX-TX UNIT (X44-1340-11, -51, -61) 11 : (K)(X), 51 : (T), 61 (W)

Ref. No.	Parts No.	Description	Re- marks
C1	CC45SL1H470J	C 47pF	
C2	CC45CH1H0R5C	C 0.5pF $\pm$ 0.25pF	
C4	CC45CH1H050C	C 5pF $\pm$ 0.25pF	
C5	C91-0131-05	C 0.01 $\mu$ F	
C6	CE04W1A470M	E 47 $\mu$ F 10V	
C7	CC45CH1H040C	C 4pF $\pm$ 0.25pF	
C8 ~ 12	C91-0131-05	C 0.01 $\mu$ F	
C13	CC45CH1H020C	C 2pF $\pm$ 0.25pF	
C14	CQ92M1H393K	ML 0.039 $\mu$ F	
C15	CQ92M1H223K	ML 0.022 $\mu$ F	
C17	CC45CH1H120J	C 12pF	
C18	CC45SL1H221J	C 220pF	
C19	CQ92M1H102K	ML 0.001 $\mu$ F	
C20	CQ92M1H103K	ML 0.01 $\mu$ F	
C21,23,26	CQ92M1H223K	ML 0.022 $\mu$ F	
C27	CE04W1A101M	E 100 $\mu$ F 10V	
C28	CQ92M1H223K	ML 0.022 $\mu$ F	
C29	CC45SL1H470J	C 47pF	
C32,35	CQ92M1H222K	ML 0.0022 $\mu$ F	
C36	CQ92M1H473K	ML 0.047 $\mu$ F	
C37	CQ92M1H223K	ML 0.0022 $\mu$ F	
C38	CQ92M1H102K	ML 0.001 $\mu$ F	
C39	CC45SL1H101J	C 100pF	
C40	CQ92M1H332K	ML 0.0033 $\mu$ F	
C41,42	CQ92M1H222K	ML 0.0022 $\mu$ F	
C43	CQ92M1H393K	ML 0.039 $\mu$ F	
C44,45	CQ92M1H223K	ML 0.022 $\mu$ F	
C46	CE04W1A470M	E 47 $\mu$ F 10V	
C47	CS15E1A220M	T 22 $\mu$ F 10V	

Ref. No.	Parts No.	Description	Re- marks
C48	CQ92M1H103K	ML 0.01 $\mu$ F	
C49	CQ92M1H392K	ML 0.0039 $\mu$ F	
C50	CS15E1V0R1M	T 0.1 $\mu$ F 35V	
C52	CC45SL1H330J	C 33pF	
C53	CS15E1A100M	T 10 $\mu$ F 10V	
C54	CQ92M1H103K	ML 0.01 $\mu$ F	
C55	CC45SL1H330J	C 33pF	
C56	CQ92M1H332K	ML 0.0033 $\mu$ F	
C57,58	CS15E1C3R3M	T 3.3 $\mu$ F 16V	
C59	CS15E1C4R7M	T 4.7 $\mu$ F 16V	
C60	C90-0131-05	C 0.01 $\mu$ F	
C62	CS15E1V0R1M	T 0.1 $\mu$ F 35V	
C63	CE04W1A330M	E 33 $\mu$ F 10V	
C65	CS15E1V0R1M	T 0.1 $\mu$ F 35V	
C66	CE04W1C220M	E 22 $\mu$ F 16V	
C68	CS15E1C4R7M	T 4.7 $\mu$ F 16V	
C69	CE04W1H010M	E 1 $\mu$ F 50V	
C70	CE04W1A330M	E 33 $\mu$ F 10V	
C71	CQ92M1H103K	ML 0.01 $\mu$ F	
C72	CQ92M1H473K	ML 0.047 $\mu$ F	
C74	CS15E1E010M	T 1 $\mu$ F 25V	
C76	CE04W1A101M	E 100 $\mu$ F 10V	
C77	CQ92M1H332K	ML 0.0033 $\mu$ F	
C79,80	CE04W1A470M	E 47 $\mu$ F 10V	
C81	CQ92M1H104K	ML 0.1 $\mu$ F	
C82	CE04W1A101M	E 100 $\mu$ F 10V	
C83	CE04W1H010M	E 10 $\mu$ F 50V	
C84,85	CC45SL1H101J	C 100pF	
C86	C90-0820-05	E 470 $\mu$ F 16V	
C87	C91-0131-05	C 0.01 $\mu$ F	
C88	C90-0820-05	E 470 $\mu$ F 16V	
C91,93,94	CE04W1A470M	E 47 $\mu$ F 10V	
C96	CE04W1C220M	E 22 $\mu$ F 16V	
C97	C91-0131-05	C 0.01 $\mu$ F	
C98,99	CE04W1C100M	E 10 $\mu$ F 16V	
C101,103	CE04W1C100M	E 10 $\mu$ F 16V	
C106	CS15E1C100M	T 10 $\mu$ F 16V	
C108	CC45SL1H101J	C 100pF	
C114	C91-0131-05	C 0.01 $\mu$ F	
C115,117	CC45SL1H101J	C 100pF	
C119,121	CC45SL1H101J	C 100pF	
C123	C91-0131-05	C 0.01 $\mu$ F	
C124	CE04W1H4R7M	E 4.7 $\mu$ F 50V	
C126	CS15E1VR47M	T 0.47 $\mu$ F 35V	
C133	CS15E1A100M	T 10 $\mu$ F 10V	
C02	CE04W1C220M	E 22 $\mu$ F 16V(T)(W)	
C03 ~ 05	C91-0433-05	Laminated cap 0.0039 $\mu$ F(T)(W)	
C06	CE04W1C220M	E 22 $\mu$ F 16V(T)(W)	
C07,08	CE04W1H010M	E 10 $\mu$ F 50V(T)(W)	
C011,013	CS15E1A150K	T 15 $\mu$ F 10V(T)	
TC1	C05-0062-05	Ceramic trimmer 6pF	
TC2,3	C05-0031-15	Ceramic trimmer 10pF	
	E04-0154-05	Coax. connector $\times$ 4	
	E23-0046-04	Square terminal	
	E23-0047-04	Square terminal (K)(X)	
	E40-0273-05	Mini connect wafer 2P	
	E40-0673-05	Mini connect wafer 6P	
	E40-0773-05	Mini connect wafer 7P	
	E40-1073-05	Mini connect wafer 10P	
	E40-1173-05	Mini connect wafer 11P	
	G02-0516-04	GND spring (B)	
	G11-0605-04	Cushion for transducer	
L1,2	L34 0909-05	Coil 4 $\phi$ 2T	☆
L3	L30 0508-05	IFT 21 6MHz	☆
L4(A B)	L71 0227 05	MCF 21 6MHZ	☆



## PARTS LIST

Ref. No.	Parts No.	Description	Re- marks
L5	L30-0510-05	IFT 21.6MHz	☆
L6	L30-0508-05	IFT 21.6MHz	☆
L7	L72-0316-05	Ceramic filter CFW455E	
L8	L30-0504-05	IFT 455kHz	
L9	L30-0503-05	IFT 455kHz	
L10	L79-0464-05	Ceramic disc CFA455S	☆
L11	L40-6825-04	Ferri-inductor 6.8mH	
L12	L40-1021-03	Ferri-inductor 1mH	
L13	L40-1541-27	Ferri-inductor 150mH	
L14	L15-0016-05	Choke coil	
L15,16	L34-0910-05	Coil 4φ3T	☆
L17	L34-0907-05	Coil 4.5φ2T	☆
L18	L34-0911-05	Coil 4.5φ1T	☆
L19	L34-0912-05	Coil 4.5φ2T	☆
X1	L77-0870-05	Crystal 22.055MHz	☆
	N30-3008-46	Round screw (IC)	
R02.03	R92-0616-05	Metal film 10kΩ	
R04	R92-0617-05	Metal film 7.5kΩ	
R05	RN14BK2E4703F	Metal film 470kΩ ±1% 1/4W	
VR1	R12-4016-05	Trim.pot 50kΩ(B)	
VR2	R12-1020-05	Trim.pot 1kΩ(B)	
VR3	R12-2015-05	Trim.pot 5kΩ(B)	
VR4	R12-1020-05	Trim.pot 1kΩ(B)	
VR5	R12-1016-05	Trim.pot 3kΩ(B)	
VR6	R12-0042-05	Trim.pot 500Ω (B)	
VR01	R12-2405-05	Trim.pot 5kΩ (T)(W)	
VR02	R12-4403-05	Trim.pot 50kΩ (T)	
BZ1	T95-0051-05	Transducer	

## RF UNIT (X44-1350-00, -11) 00:(T)(W)(X), 11:(K)

Ref. No.	Parts No.	Description	Re- marks
C1	CC45CH1H150J	C 15pF	
C4,6,7,9	CC45SL1H101J	C 100pF	
C10	C91-0131-05	C 0.01μF	
C12	CC45SL1H101J	C 100pF	
	E04-0154-05	Coax. connector	
	E18-0110-05	Wire post	☆
	G01-0811-05	Spring	☆
L1	L40-1091-03	Ferri-inductor 1mH	
HB(A)	L79-0463-25	Helical block (A) (T)(W)(X)	☆
HB(A)	L79-0470-15	Helical block (A) (K)	☆
HB(B)	L79-0465-15	Helical block (B) (T)(W)(X)	☆
HB(B)	L79-0471-15	Helical block (B) (K)	☆
HB(C)	L79-0466-25	Helical block (C) (T)(W)(X)	☆
HB(C)	L79-0472-15	Helical block (C) (K)	☆
	N87-2606-46	Self tapping screw × 6	

## FINAL UNIT (X45-1160-00, -11, -51)

00:(X), 11:(K), 51:(T)(W)

Ref. No.	Parts No.	Description	Re- marks
	B42-1696-04	Name plate TONE PAD (K)	☆
C2	C91-0466-05	Cap 0.001μF	☆

Ref. No.	Parts No.	Description	Re- marks
C3	CE04W1C220M	E 22μF 16V	
C4	C91-0466-05	Cap. 0.001μF	☆
C5	CE04W1C220M	E 22μF 16V	
C6	CC45SL2H040C	C 4pF ±0.25pF	
C9	CC45SL2H080D	C 8pF ±0.5pF	
C10	CC45SL2H040C	C 4pF ±0.25pF	
C11	CC45SL2H030C	C 3pF ±0.25pF	
C14	C91-0466-05	Cap 0.001μF	☆
C16,17	CC45SL1H101J	C 100pF	
C01~03	CC45SL1H101J	C 100pF (K)	
J1	E40-0473-05	Mini connect wafer 4P	
J2	E40-0373-05	Mini connect wafer 3P	
J3	E04-0109-15	UHF type receptacle (K)(X)	
J3	E04-0151-05	N type receptacle (T)(W)	
J4	E11-0403-05	Phone jack	
J5	E08-0203-25	2P connector	
J6	E08-0304-05	Power jack (T)(W)(X)	
J6	E08-0471-05	4P socket TONE PAD (K)	
	E23-0015-04	Earth lug	
	F01-0750-05	Heat sing (T)(W)(X)	☆
	F01-0756-05	Heat sink (K)	☆
L1	L34-0928-05	Coil 4.5φ1.5T	☆
L2	L34-0907-05	Coil 4.5φ2T	☆
	N30-2604-46	Round screw PC board	
	N30-2606-11	Round screw	
	N35-3006-46	Bind screw ANT, MODULE	
R1	R92-0116-05	Cement resistor 0.47Ω	
R2,3	R92-0624-05	Cement resistor 0.68Ω	☆
VR1	R12-4020-05	Trim.pot 50kΩ	
VR2	R12-2407-05	Trim.pot 3kΩ	☆
RL1	S51-1408-05	Lead relay DC12V	☆

## PLL UNIT (X50-1670-11, -51, -61, -71)

11:(K), 51:(T), 61:(W), 71:(X)

Ref. No.	Parts No.	Description	Re- marks
C1	C91-0131-05	C 0.01μF	
C3	CS15E1V010M	T 1μF 35V	
C4	C91-0131-05	C 0.01μF	
C7	CC45SL1H101J	C 100pF	
C8	CC45CH1H080D	C 8pF ±0.5pF	
C9	CC45CH1H020C	C 2pF ±0.25pF(K)	
C9	CC45CH1H030C	C 3pF ±0.25pF(T)(W)(X)	
C10	CQ92M1H473K	ML 0.047μF	
C12	CC45PG1H060D	C 6pF ±0.5pF	
C13	CC45CH1H080D	C 8pF ±0.5pF	
C14	CC45CH1H010C	C 1pF ±0.25pF(K)	
C14	CC45CH1H020C	C 2pF ±0.25pF(T)(W)(X)	
C15	CC45SL1H101J	C 100pF	
C17	CE04W1A101M	E 100μF 10V	
C18	CC45CH1H070D	C 7pF ±0.5pF	
C19	CC45CH1H080D	C 8pF ±0.5pF	
C20	CC45CH1H010C	C 1pF ±0.25pF	
C22,23	CC45SL1H101J	C 100pF	
C26	CC45CH1H1R5C	C 1.5pF ±0.25pF	
C29,30	CC45SL1H101J	C 100pF	
C32	CC45CH1H020C	C 2pF ±0.25pF	
C35	CC45CH1H010C	C 1pF ±0.25pF	
C37,39	CC45SL1H101J	C 100pF	
C41	C91-0131-05	C 0.01μF	

# PARTS LIST

TR-840

Ref. No.	Parts No.	Description	Re- marks
C42	CC45CH1H030C	C 3pF $\pm 0.25\mu\text{F}$	
C43~45	C91-0131-05	C 0.01 $\mu\text{F}$	
C46	CE04W1A101M	E 100 $\mu\text{F}$ 10V	
C47,48	CS15E1C6R8M	T 6.8 $\mu\text{F}$ 16V	
C49	C91-0131-05	C 0.01 $\mu\text{F}$	
C50	CE04W1A101M	E 100 $\mu\text{F}$ 10V	
C51	CS15E1V0R1M	T 0.1 $\mu\text{F}$ 35V	
C52	CE04W1A101M	E 100 $\mu\text{F}$ 10V	
C53	CC45SL1H270J	C 27pF	
C54	CC45CH1H180J	C 18pF	
C55	CE04W1A101M	E 100 $\mu\text{F}$ 10V	
C72,73	CC45SL1H470J	C 47pF	
C74	C91-0131-05	C 0.01 $\mu\text{F}$	
C75~77	CQ92M1H223K	ML 0.022 $\mu\text{F}$	
C78	CC45SL1H101J	C 100pF	
C79	CQ92M1H223K	ML 0.022 $\mu\text{F}$	
C80	C91-0131-05	C 0.01 $\mu\text{F}$	
C81	CC45SL1H101J	C 100pF	
C82~85	C91-0131-05	C 0.01 $\mu\text{F}$	
C88,89	C91-0131-05	C 0.01 $\mu\text{F}$	
C90,91	CC45SL1H390J	C 39pF	
C93	CC45CH1H0R5C	C 0.5pF $\pm 0.25\mu\text{F}$	
C94	CC45SL1H470J	C 47pF	
C95	CC45SL1H101J	C 100pF	
C99	CC45CH1H050C	C 5pF $\pm 0.25\mu\text{F}$	
C104	C91-0131-05	C 0.01 $\mu\text{F}$	
C106	CE04W1C470M	E 47 $\mu\text{F}$ 16V	
C107	CE04W1C330M	E 33 $\mu\text{F}$ 16V	
C108	C91-0131-05	C 0.01 $\mu\text{F}$	
C109	CE04W1A470M	E 47 $\mu\text{F}$ 10V	
C110	CE04W1A101M	E 100 $\mu\text{F}$ 10V	
C111,112	C90-0828-05	E 470 $\mu\text{F}$ 10V	☆
C113	C90-0827-05	E 330 $\mu\text{F}$ 16V	☆
C115	CE04W1A101M	E 100 $\mu\text{F}$ 10V	
C117	CE04W1H010M	E 1 $\mu\text{F}$ 50V	
C118	CE04W1H2R2M	E 2 2 $\mu\text{F}$ 50V	
C123	CC45SL1H470J	C 47pF	
C124	CS15E1VR22M	T 0.22 $\mu\text{F}$ 35V	
C151	CS15E1V0R1M	T 0.1 $\mu\text{F}$ 16V	
C201	C91-0131-05	C 0.01 $\mu\text{F}$ (T)(W)	
C202	C91-0131-05	C 0.01 $\mu\text{F}$ (T)(W)(X)	
C203~206	C91-0131-05	C 0.01 $\mu\text{F}$ (T)(W)	
C207~210	CC45SL1H820J	C 82pF	
C211	CC45SL1H820J	C 82pF (T)(W)(X)	
C212	CC45SL1H820J	C 82pF (T)(W)	
TC1,2	C05-0308-05	Ceramic trimmer 4pF	
TC201~204	C05-0315-05	Ceramic trimmer 60pF	☆
TC205	C05-0315-05	Ceramic trimmer 60pF(T)(W)(X)	☆
TC206	C05-0315-05	Ceramic trimmer 60pF(T)(W)	☆
	E23-0046-04	Square terminal	
	E31-2061-05	Cable with terminal (A) for TX	☆
J1,7	E40-0373-05	Mini connect wafer 3P	
J2	E40-0473-05	Mini connect wafer 4P	
J3	E40-0973-05	Mini connect wafer 9P	
J4	E40-1173-05	Mini connect wafer 11P	
J5,6	E40-1273-05	Mini connect wafer 12P	
L1	L40-1511-03	Ferri-inductor 150 $\mu\text{H}$	
L2,3	L34-0904-05	Coil 3 $\phi$ 10T	☆
L4	L34-0908-05	Coil 3 $\phi$ 10T	☆
L5	L32-0626-05	OSC coil	☆
L6	L33-0605-05	Choke coil 0.47 $\mu\text{H}$	
L7,8	L34-0905-05	Coil 4 $\phi$ 3T	☆
L9	L34-0906-05	Coil 4 $\phi$ 4T	☆
L10~12	L40-1511-03	Ferri-inductor 150 $\mu\text{H}$	
L13	L40-1021-03	Ferri-inductor 1mH	
L14	L40-3391-03	Ferri-inductor 3 3 $\mu\text{H}$	

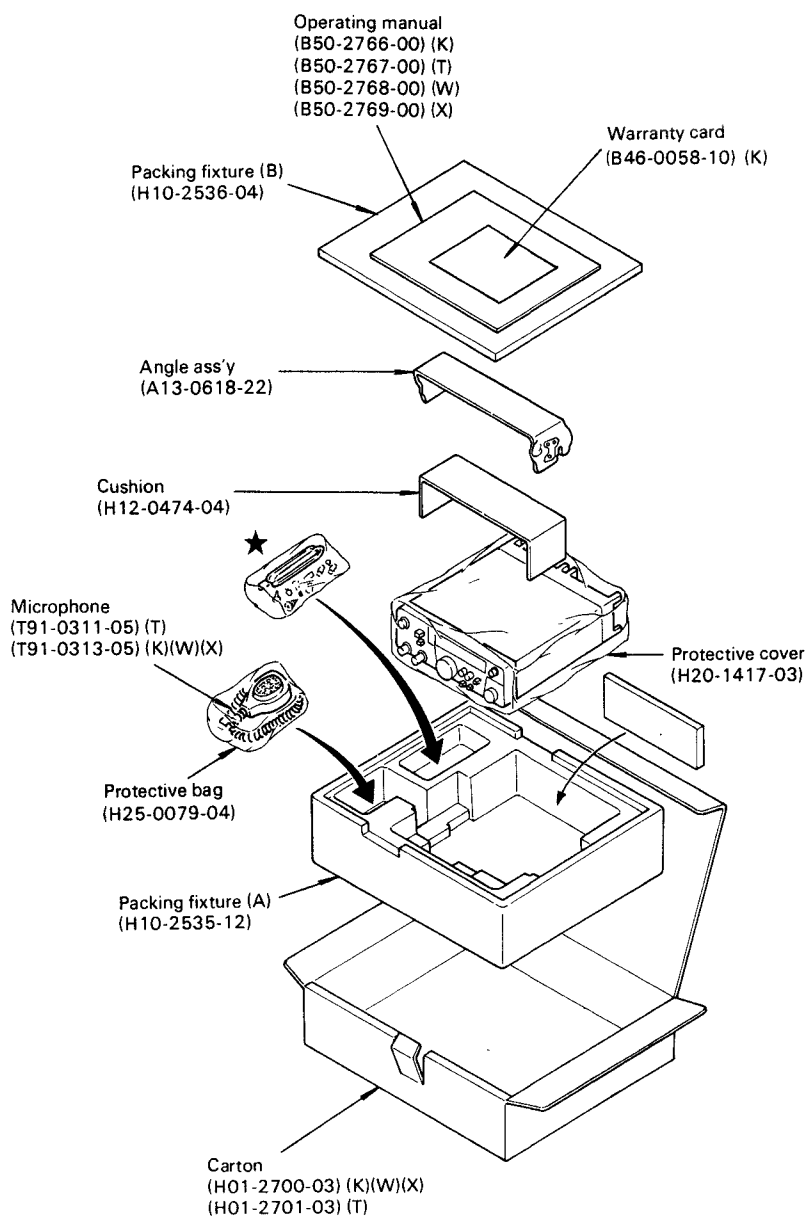
Ref. No.	Parts No.	Description	Re- marks
L15	L40-1511-03	Ferri-inductor 150 $\mu\text{H}$	
L16,17	L40-1001-03	Ferri-inductor 10 $\mu\text{H}$	
L20~23	L32-0627-05	OSC coil 5A-13T	☆
L24,25	L40-1511-03	Ferri-inductor 150 $\mu\text{H}$	
L26,27	L34-0903-05	Tuning coil	☆
L28	L79-0462-05	Helical block	☆
L29,30	L19-0309-05	Wide bandwidth transformer	
L31	L30-0503-05	IFT	
L207,208	L40-1001-03	Ferri-inductor 10 $\mu\text{H}$	
L209	L40-1001-03	Ferri-inductor 10 $\mu\text{H}$ (T)(W)(X)	
L210	L40-1001-03	Ferri-inductor 10 $\mu\text{H}$ (T)(W)	
L211	L32-0627-05	OSC coil 5A-13T (T)(W)(X)	☆
L212	L32-0627-05	OSC coil 5A-13T (T)(W)	☆
X1	L77-0720-05	Crystal 10.240MHz	
X2	L77-0875-05	Crystal R-L 45.8778MHz (K)	☆
X2	L77-0907-05	Crystal R-L 44.7667MHz (T)(W)(X)	☆
X3	L77-0876-05	Crystal R-H 46.4333MHz (K)	☆
X3	L77-0908-05	Crystal R-H 45.3222MHz (T)(W)(X)	☆
X4	L77-0877-05	Crystal T-L 48.2778MHz (K)	☆
X4	L77-0909-05	Crystal T-L 47.166MHz (T)(W)(X)	☆
X5	L77-0878-05	Crystal T-H 48.8333MHz (K)	☆
X5	L77-0910-05	Crystal T-H 47.7222MHz (T)(W)(X)	☆
X201	L77-0879-05	Crystal +1.6MHz 47.3444MHz (T)	☆
X201	L77-0881-05	Crystal -7.6MHz 46.8778MHz (W)	☆
X201	L77-0880-05	Crystal -1.6MHz 56.9889MHz (X)	☆
X202	L77-0880-05	Crystal -1.6MHz 46.9889MHz (T)(W)	☆
R105	R90-0531-05	Resistor block 47k $\Omega$ $\times$ 10	☆
R112	R90-0526-05	Resistor block 27k $\Omega$ $\times$ 4	
	R92-0150-05	Short jumper	

## DISPLAY UNIT (X54-1520-11)

Ref. No.	Parts No.	Description	Re- marks
	B07-0629-03	LED case	☆
	B08-0302-04	Back board	☆
C2	CE04W1C100M	E 10 $\mu\text{F}$ 16V	
	E23-0426-05	Earth lug $\phi$ 2	☆
	J31-0515-14	Collar for spacer	☆
	N10-2020-46	Nut	
	N15-1020-46	Flat washer	
	N30-2020-46	Round screw	
	R92-0150-05	Short jumper	

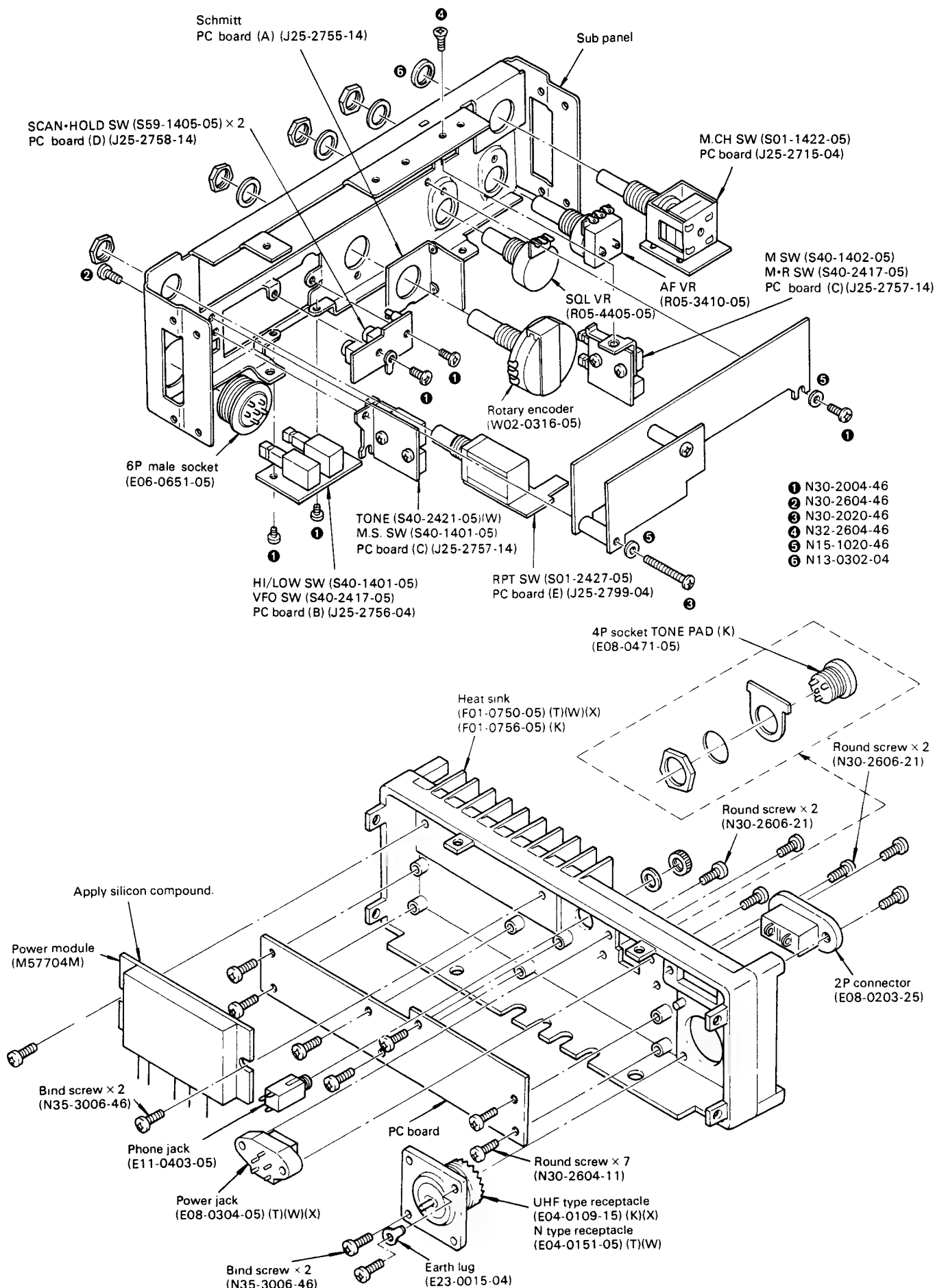
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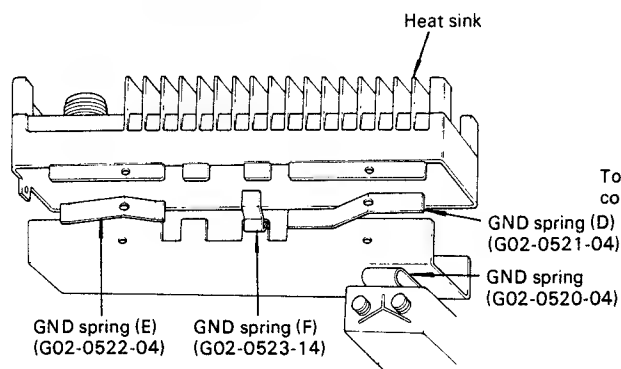


★ Protective bag (H25-0103-04)	
4P plug (TONE PAD)(E09-0471-05)	1 (K)
Phone plug (E12-0001-05)	1
DC cord ass'y (E30-1648-05)	1
Front foot (J02-0420-04)	1
Rear foot (J02-0022-05)	2
Foot mounting hardware (J21 2676 04)	2
Fuse (4A) (F05-4022-05)	1
Protective bag (H25-0029-04)	
Flat washer (angle) (J32-0748-04)	4
Bind screw (N35-3012-45)	4
Protective bag (H25-0049-03)	
Round screw (N09-0008-04)	4
Flange nut (N14-0510-04)	4
Flat washer (N15-1060-46)	4
Spring washer (N16-0060-46)	4
Bind screw (N35-3006-45)	6

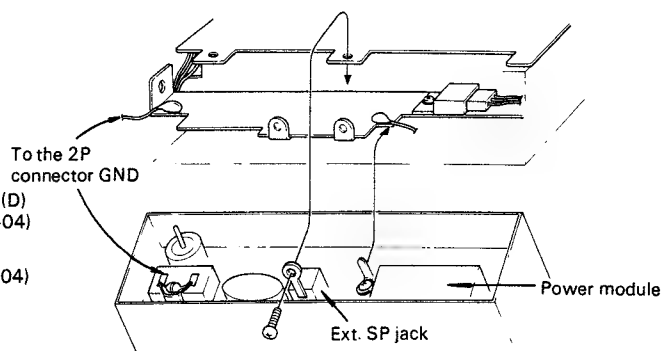
# DISASSEMBLY



# DISASSEMBLY

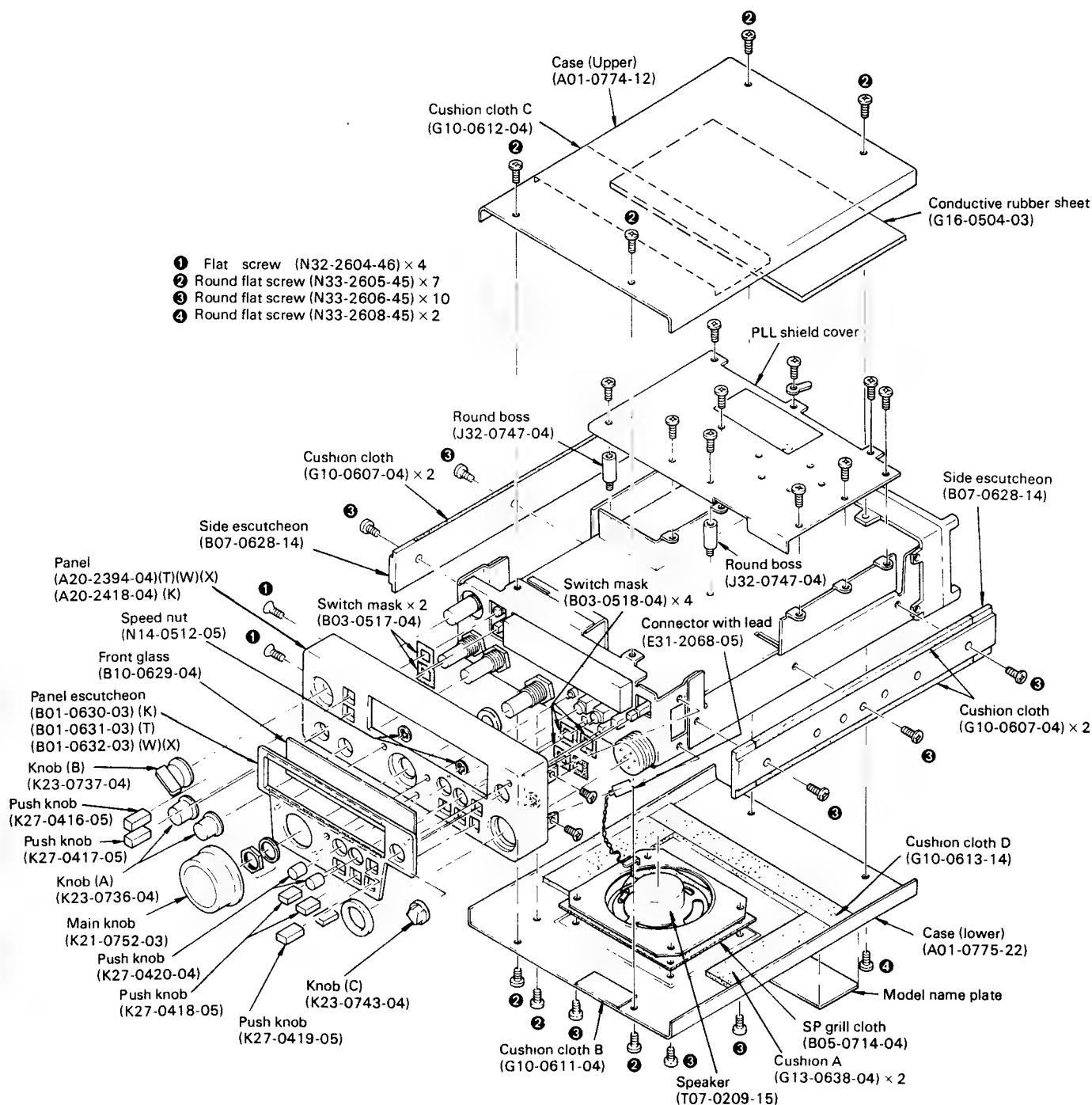


&lt; GND spring &gt;



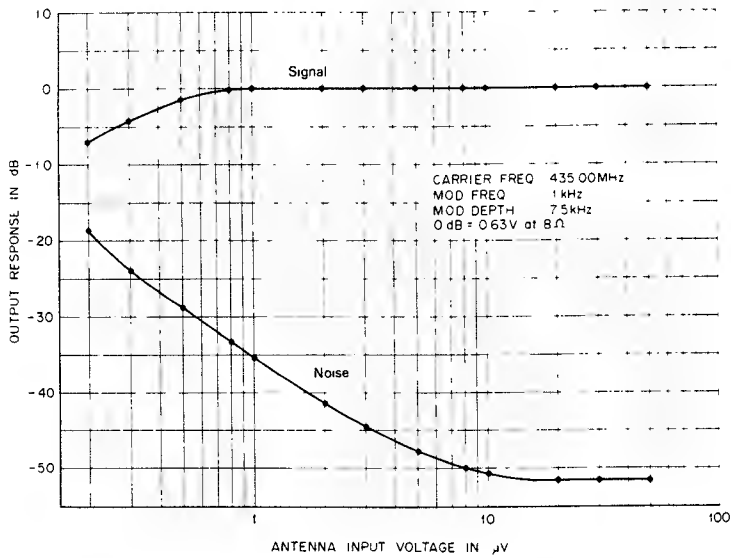
&lt; FINAL unit grounding &gt;

- ① Flat screw (N32-2604-46) × 4
- ② Round flat screw (N33-2605-45) × 7
- ③ Round flat screw (N33-2606-45) × 10
- ④ Round flat screw (N33-2608-45) × 2

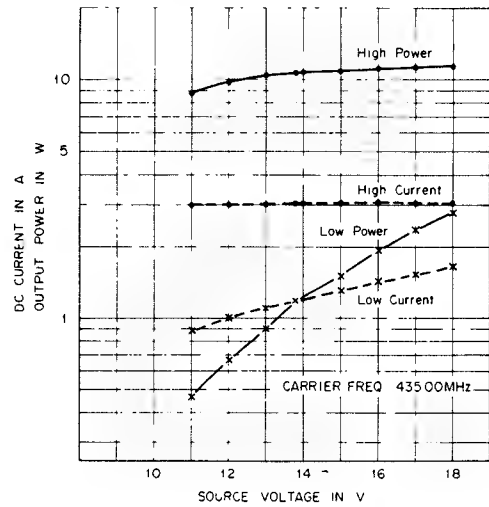


## REFERENCE DATA

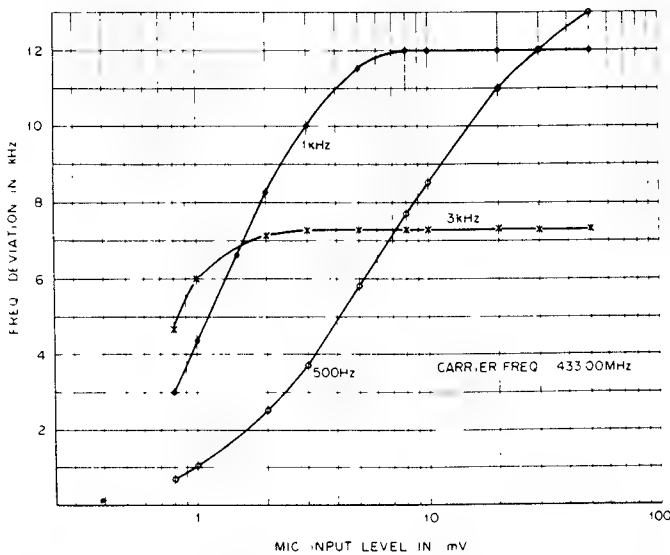
[RX Sensitivity]



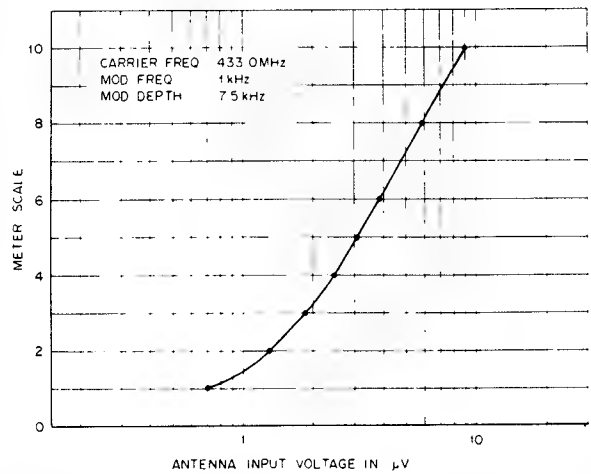
[Output power]



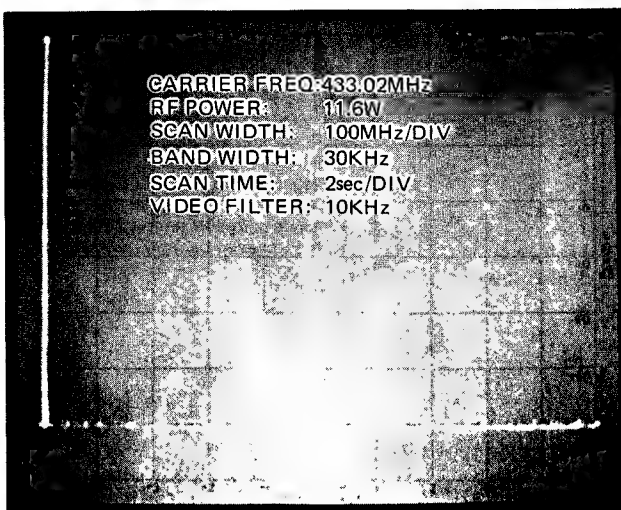
[Deviation]



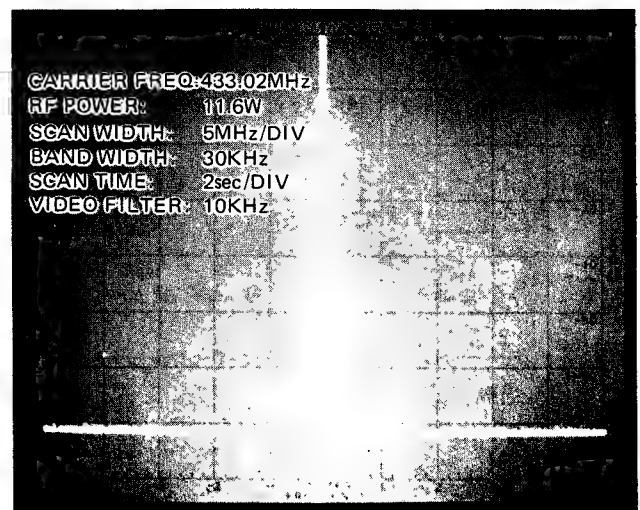
[S meter]



[Harmonics spurious response]

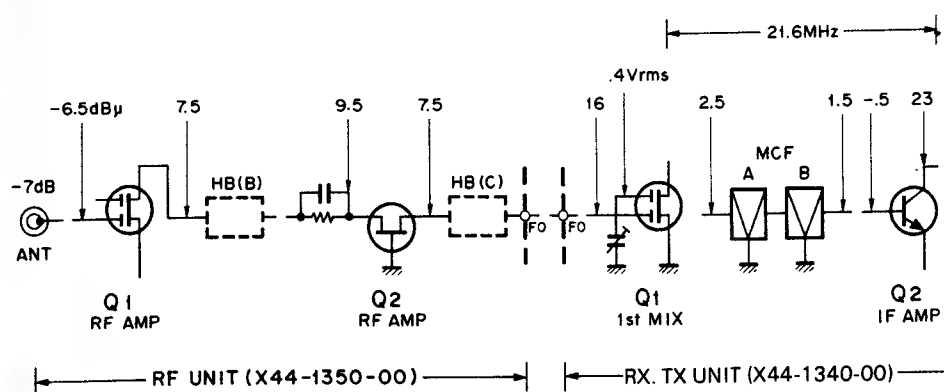


[Near spurious response]



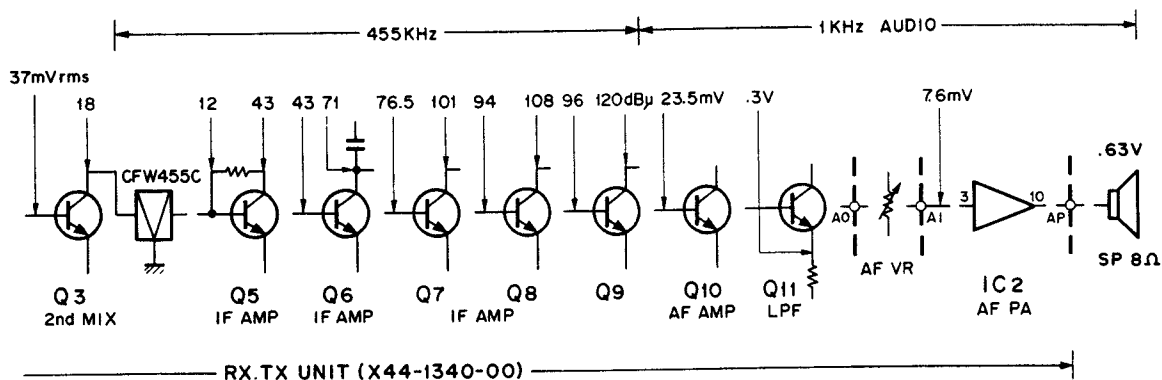
# LEVEL DIAGRAM

## RX Section

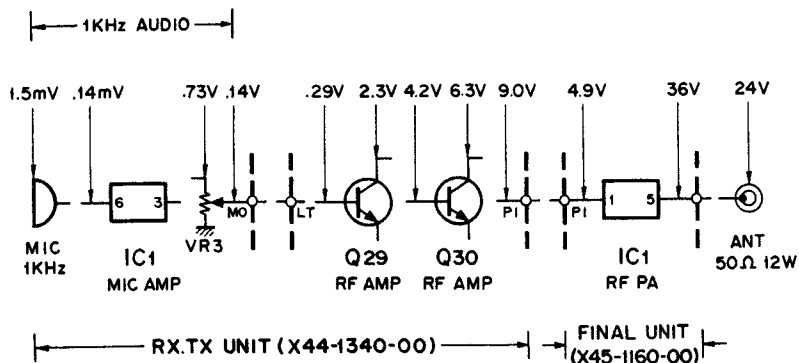


### Note:

1. To inject signal generator output connect a  $0.01 \mu\text{F}$  500V capacitor between the signal generator and the check point.
2. In measuring the circuit from the ANT terminal to the collector of Q9, unmodulated 435.000 MHz (445.000 MHz: K type), 21.6 MHz, and 455 kHz signals from an SSG are applied to the check point to obtain a 10 dB NQ sensitivity.
3. In measuring the circuit from the base of Q10 to the SP terminal, an SSG signal of 435.000 MHz (445.000 MHz: K type), 6 dBμ, 1 kHz MOD, 5 kHz DEV is applied to the ANT terminal, and the AF control is adjusted to obtain an AF output of 0.63V/8Ω. The signal voltage at each point is measured with an AF VTVM.



## TX Section



### Note:

1. All voltage measurements except MIC AMP section are read from an RF VTVM at HI power position. Voltages in MIC AMP are measured by AF VTVM with an input of 1 kHz, 1.5 mV.
2. Voltages before PI terminal are measured with PI coaxial cable disconnected.



## ADJUSTMENTS

### < Test Equipment >

1. **VTVM or DVM**
  - Input resistance: More than 1 M $\Omega$
  - Voltage range: 1.5 to 1000V AC/DC
2. **RF VTVM (RF V.M.)**
  - Input impedance: 1 M $\Omega$  and less than 2 pF
  - Voltage range: 10 mV to 300V
  - Frequency range: 450 MHz or greater
3. **Frequency counter (F count)**
  - Minimum input voltage: 50 mV
  - Frequency range: 450 MHz or greater
4. **DC power supply**
  - Voltage: 10V to 17V variable
  - Current: 6A min.
5. **RF Dummy Load**
  - Dissipation: 20W
  - Impedance: 50 $\Omega$
  - Frequency range: 450 MHz
6. **AF VTVM (AF V.M.)**
  - Input impedance: 1 M $\Omega$  or greater
  - Voltage range: 1 mV to 30V
  - Frequency range: 50 Hz to 10 kHz
7. **AF Generator (AG)**
  - Frequency range: 100 Hz to 10 kHz
  - Output: 0.5 mV to 1V
8. **Linear detector**
  - Frequency range: 450 MHz
9. **Directional coupler**
10. **Oscilloscope**
  - With horizontal input and high sensitivity
11. **Standard signal generator (SSG)**
  - Frequency range: 450 MHz band
  - Modulation: amplitude and frequency modulation
  - Output: -20 dB/0.1  $\mu$ V ~ 120 dB/1V
12. **AF Dummy load**
  - 8 $\Omega$ , 5W (approx.)
13. **Sweep generator**
  - Frequency range: 420 ~ 460 MHz

### < Preparation >

Unless otherwise specified, set the controls as follows.

POWER / VOL SW	ON
SEND / REC	REC
SQUELCH VOL	MIN
M. CH SW	1
M. SW	OFF
M. R SW	OFF
TX OFF SET	S
SCAN SW	OFF
HOLD SW	OFF
M. S SW	OFF
VFO A / B SW	A
HI / LOW SW	HI

#### Notes:

- When adjusting the trimmers or coils, use a non-inductive adjusting rod of bakelite, etc.
- NEVER transmit when SSG is connected to the ANT terminal.
- Connect MIC connector as shown in Fig. 18.
- The SSG output level as indicated is open circuit voltage.

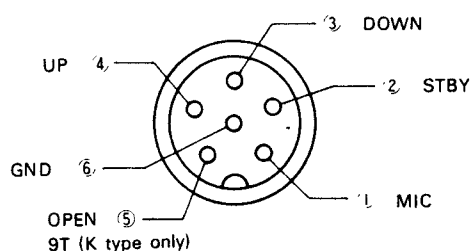


Fig. 18 MIC terminals (view from front panel side)

# ADJUSTMENTS

## VOLTAGE CHECK

Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method		
1. Voltage check	(1) Connect a DC power supply (13.8V) to the DC terminal on the rear panel.	DVM	RX/TX	8C				7.8 ~ 8.25V	
				8R				8.4 ~ 9.0V	
				9T				0V	
				DB MB				0.5V or less 5.7 ~ 6.1V	
			PLL	Pin 16 of IC6				5.7 ~ 6.1V	
	(2) POWER: OFF	DVM	RX/TX	MB	RX/TX	VR4	5.9 ± 0.2V		
	(3) POWER: ON Set in transmit mode.	DVM	RX/TX	9T 8R DB				8.8 ~ 9.8V 0.5V or less 8 ~ 13.8V	
	(4) Set in receive mode.								

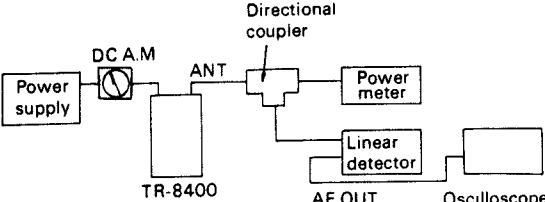
## PLL ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method		
1. PLL (I)	(1) Remove the PLL shield. VFO dial: 0.000 Disconnect the coaxial connector from the RX-TX unit P1 terminal. Ground TP5 (R21) on the PLL unit.	RF V.M	PLL	TP3	PLL	L27 L28	MAX (repeat)	0.03 ~ 0.07V	
	(2) VFO dial: 9.975 Set in transmit mode.	RF V.M	PLL	TP3	PLL	L26 L28 (B)	MAX	0.03 ~ 0.07V	
	(3) Repeat steps (1) and (2) several times.								
	(4) Set in receive mode. VFO dial: 9.975	RF V.M	PLL	TP3				0.03 ~ 0.07V	Check
	(5) Set in transmit mode. VFO dial: 0.000	RF V.M	PLL	TP3				0.03 ~ 0.07V	Check
2. PLL (II)	(1) Disconnect TP5 from ground.								
	(2) VFO dial: 9.975 Set in transmit mode.	DVM	PLL	TP1	PLL	TC2	6.45 ± 0.2V		
	(3) Set in receive mode. VFO dial: 0.000 9.975 (K) type	DVM	PLL	TP1	PLL	TC1	0.95 ± 0.2V 6.45 ± 0.2V (K)		
	(4) Repeat steps (2) and (3) several times.								
	(5) VFO dial: 0.000 Set in transmit mode.	DVM	PLL	TP1				1.0V or more	Check
	(6) Set in receive mode.	DVM	PLL	TP1				1.0V or more	Check
3. PLL (III)	(1) VFO dial: 9.975 Set in transmit mode.	RF V.M	PLL	TP6	PLL	L9	Adjust coil spacing for maximum voltage		
	(2) VFO dial: 0.000 Set in receive mode.	RF V.M	PLL	TP4				1.8V or more	
	(3) VFO dial: 9.975 Set in transmit mode.	RF V.M	PLL	TP2	PLL	L7, 8	Adjust coil spacing for maximum voltage.	Approx. 0.2V	
4. Unlock	(1) Set in receive mode. Ground TP5 on the PLL unit.								
	(2) VFO dial: 0.000	DVM	PLL	TP1				5.3 ~ 5.7V	
	(3) VFO dial: 9.975	DVM	PLL	TP1				7.3V or more	
				UL				Approx. 1.2V	
				ULB				0.2V or less	
	(4) Disconnect TP5 from ground.								

# ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method		
5. PLL shield	(1) Install PLL shield.								
6. Frequency adjustment	(1) Set in receive mode.	F. counter	PLL	TP2	PLL				
	VFO dial				Part	(T)(W)(X) type	(K) type	Specifications	
	0.000				L20	408.400.00 MHz	418.400.00 MHz	±200 Hz	
	0.025				TC201	408.425.00 MHz	418.425.00 MHz		
	9.950				L21	418.350.00 MHz	428.350.00 MHz		
	9.975				TC202	418.375.00 MHz	428.375.00 MHz		
	(2) Set in transmit mode.								
	VFO dial				Part	(T)(W)(X) type	(K) type	Specifications	
	0.000				L22	430.000.00 MHz	440.000.00 MHz	±200 Hz	
	0.025				TC203	430.025.00 MHz	440.025.00 MHz		
	9.950				L23	439.950.00 MHz	449.950.00 MHz		
	9.975				TC204	439.975.00 MHz	449.975.00 MHz		
	(3) Set in transmit mode.								
	(K) type	TX OFF SET: ⊖ VFO dial: 9.950 TX OFF SET: ⊕ VFO dial: 0.000			—	444.950.00 MHz	Check		
					—	445.000.00 MHz			
	(T) type	TX OFF SET: ⊖ VFO dial: 0.000 0.025			L211 TC205	428.400.00 MHz 428.425.00 MHz	±200 Hz		
		TX OFF SET: ⊕ VFO dial: 0.000 0.025			L212 TC206	431.600.00 MHz 431.625.00 MHz	±200 Hz		
	(W) type	TX OFF SET: D-A VFO dial: 9.950 9.975			L211 TC205	432.350.00 MHz 432.375.00 MHz	±200 Hz		
		TX OFF SET: D-B VFO dial: 0.000 0.025			L212 TC206	428.400.00 MHz 428.425.00 MHz	±200 Hz		
	(X) type	TX OFF SET: D-A VFO dial: 9.950 0.000 0.025			— L211 TC205	434.350.00 MHz 428.400.00 MHz 428.425.00 MHz	Check ±200 Hz		
7. Lock voltage	(1) TX OFF SET: S VFO dial: 9.975 Set in transmit mode	DVM	PLL	TP1	PLL	TC2	6.45V	±0.05V	
	(2) Set in receive mode VFO dial: 0.000 9.975 (K) type	DVM	PLL	TP1	PLL	TC1	0.95V 6.45V (K)	±0.05V	
	(3) Connect the coaxial connector to the PI terminal on the RX-TX unit.								

## TX ADJUSTMENT

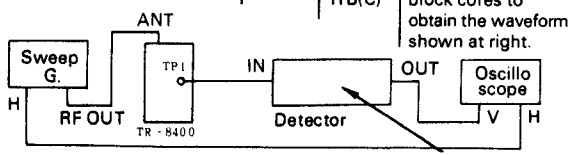
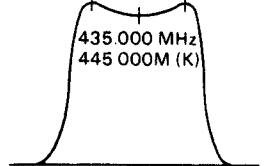
Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method		
1 Setting	(1) VR2 on the FINAL unit: Fully counterclockwise								
	(2) VR5 on the TX•RX unit: 10 o'clock								
	(3) Connect the power meter to the ANT terminal								

# ADJUSTMENTS

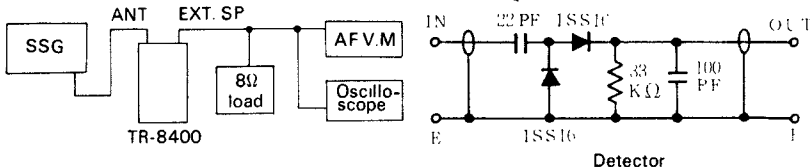
Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method		
2. Power adjustment	(1) VFO dial: 5.000 Set in transmit mode.	DC A.M. Power meter			RX/TX	TC2, 3	Adjust TC2 and 3 for maximum DC current. Then adjust TC3 for maximum RF power with less current.		
		Power meter			RX/TX	VR5	Set VR5 to obtain 12W.		
					Final	VR1	Set VR1 so that LED "6" is lit.		
	(2) HI/LOW SW: LOW	Power meter			RX/TX	VR6	Set VR6 to obtain 1.2W.		
		RF meter						LEDs "1", "2" and/or "3" must be lit	Check
3. Protection	(1) HI/LOW SW: HI Disconnect the power meter from the ANT terminal.	DC A.M.			Final	VR2	Adjust VR2 to read 3.7A.	$\pm 0.1$ A	
	(2) Connect the power meter to the ANT terminal.	Power meter, DC A.M.						10~14W 3.4A or less	Check
4. Power check	(1) Set the power supply voltage to 13.8V VFO dial: 0.000 and 9.975	Power meter, DC A.M.						10~14W 3.4A or less	
	(2) Set the power supply voltage to 11.5V. VFO dial: 0.000 and 9.980	Power meter						6W or more	
5. Modulation	(1) Set power supply voltage to 13.8V VFO dial: 5.000 Connect the AG (20 mV, 1 kHz) to the MIC terminal.	Linear detector			RX/TX	VR3	Adjust VR3 for 5 kHz deviation.	$\pm 0.5$ kHz	
	(2) Set AG output to 2 mV, 1 kHz.				RX/TX	VR2	Adjust VR2 for 3.5 kHz deviation.	$\pm 0.5$ kHz	
	(3) Check for abnormal oscillation by varying the power supply voltage from 11.5V to 13.8V at the any channel.							There should be no abnormal oscillation.	
	(4) Set in receive mode.								
6. Tone (W, T type)	(1) Frequency adjustment Tone SW: ON Set in transmit mode.		RX/TX	R5	RX/TX	VR01		1750 Hz $\pm 10$ Hz	
	(2) Deviation adjustment Tone: OFF Set in transmit mode.	Linear detector						$\pm 2.5$ kHz or more	Check
	(3) T type only Set in transmit mode.	Linear detector or receiver			RX/TX	VR02	Adjust VR02 so that tone is heard approx. in 7 sec. after transmit.		

## RECEIVER ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method		
1. Helical resonator	(1) Disconnect the coaxial connector from the LR terminal on the RX-TX unit. Connect a sweep generator to the ANT terminal.	Sweep G.	RX/TX	TP1	RF	HB(A) HB(B) HB(C)	Adjust the 6 helical resonator block cores to obtain the waveform shown at right.	440.000M (K) 450.000M (K) 430.000M 440.000M	
	(2) Reconnect the coaxial connector to the LR terminal on the RX-TX unit.								

## ADJUSTMENTS

Item	Condition	Measurement			Adjustment			Specifications	Remarks
		Test equipment	Unit	Ter- minal	Unit	Part	Method		
2 Sensitivity adjustment	(1) Connect a S meter (100 $\mu$ A) to the M terminal on the RX-TX unit. Connect an AF V.M. oscilloscope and an 8 $\Omega$ load to the EXT. SP terminal. Connect an SSG (MOD. 1 kHz/DEV: 5 kHz) to the ANT terminal.								
	(2) VFO dial: 5.050 Squelch VR MIN Receive the SSG signal and adjust for maximum signal strength reading.	S meter			RX/TX	TC1 L3, 5, 6	} MAX (repeat)		
	(3) Set the SSG output level to 40 dB.	AF V.M			RX/TX	L9		MAX	
3 S meter (indicator)	(1) Set the SSG output level to 16 dB. Disconnect the S meter from the M terminal	S-indicator			RX/TX	VR1	Adjust VR1 so that the LED "8" indicator is lit.		
4 Squelch	(1) Set the SSG output level to -10 dB. Fine tune the SSG output frequency so that the SSG signal is received at maximum strength.								
	(2) VFO dial: 5.075 Turn the squelch control until noise is gated	BUSY lamp						Must go off	Check
		Squelch control setting						9 o'clock to 12 o'clock	
	(3) VFO dial: 5.050	BUSY lamp						Must be lit when the SSG signal is again received	Check
	(4) SQUELCH VR: MIN								
5 Sensitivity measurement	(1) SSG output level: -6 dB (VFO dial: 5.050) Fine tune the SSG frequency to obtain the maximum AF VTVM reading.	AF V.M			<div>For Service Manuals <b>MAURITRON SERVICES</b> 8 Cherry Tree Road, Chinnor Oxfordshire, OX9 4QY. Tel (01844) 361694 Fax (01844) 362554 email:- mauritron@diat.pipex.com</div>			S/N 20 dB or more	Check
	(2) SSG output level: -5 dB VFO dial: 0.050 and 9.975	AF V.M							

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## MICROPROCESSOR OPERATION CHECK

Item	Control functions	Microprocessor functions	Remarks
1. VFO A/B	(1) Pull out the power plug, then reinsert it after waiting 20 sec.	0.0000 is displayed.	Reset operation check
	(2) VFO A/B: B	0.0000 is displayed, VFO B indicator is lit.	
2. Main dial	(1) Turn the main dial.	Indication changes in 25 kHz increments.	
3. UP/DOWN	(1) Press the UP or DOWN switch once.	When pressed, a tone is generated and the frequency indication increases or decreases in 25 kHz increments.	
	(2) Press and hold the UP or DOWN switch.	The frequency indication increases or decreases continuously, accompanied by a continuous tone.	
	(3) Press the UP and DOWN switch simultaneously.	The frequency does not change.	

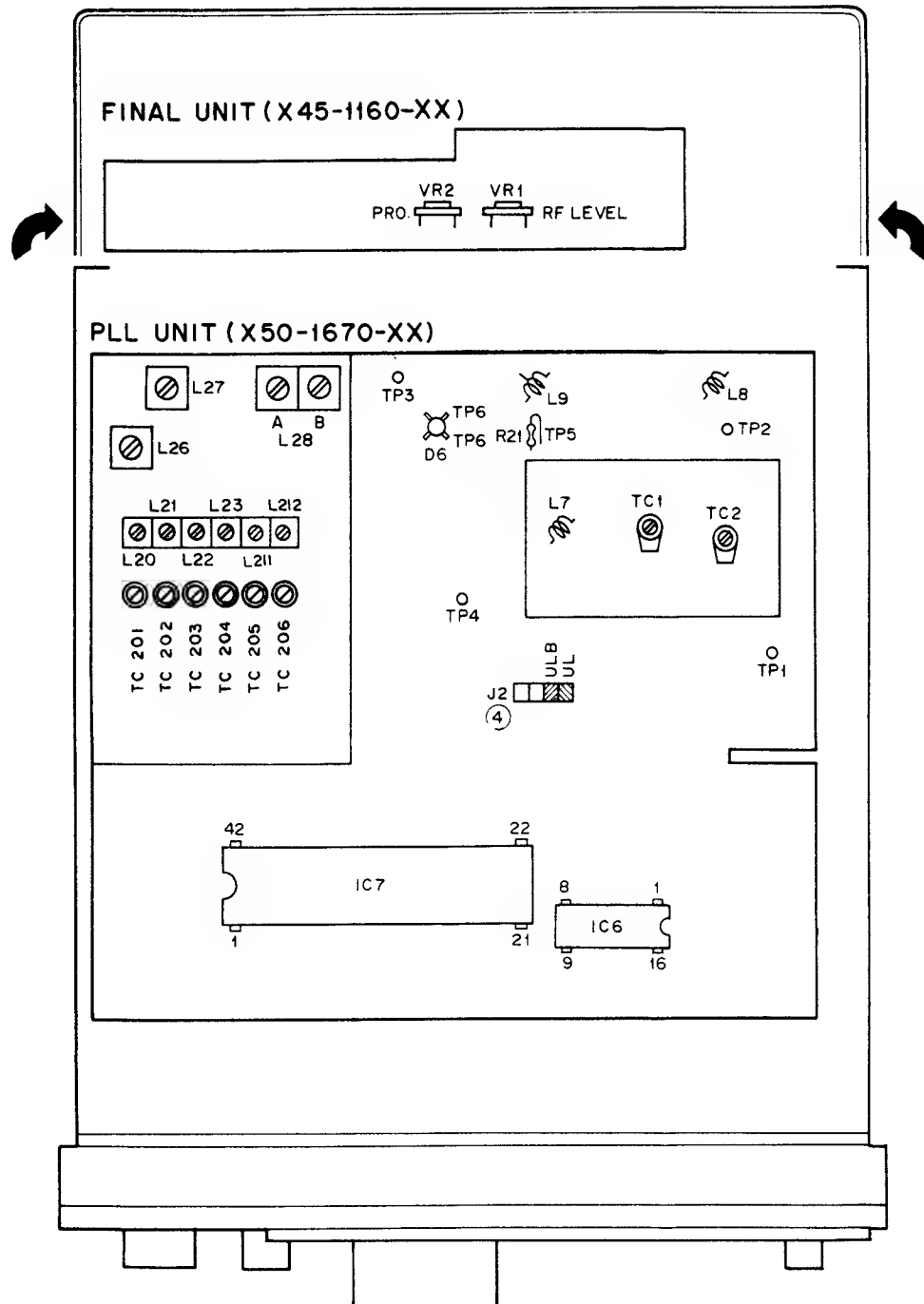
# ADJUSTMENTS

TR-8400

Item	Control functions	Microprocessor functions	Remarks
4. Memory entry	(1) M. CH switch: 1 ~ 5 M. R switch: ON	0.000 is displayed.	
	(2) M. R switch: OFF M. S switch: ON	0.000 is displayed.	
	(3) M. S switch: OFF M. CH switch: 1 ~ 5 M switch: ON	Pressing the M switch causes a tone to be generated and the displayed frequency to be stored in the selected memory corresponding to the M. CH switch setting.	
	(4) M. CH switch: 5 Set the main dial in a position different from that set during step (3). Set in transmit mode and then press the M switch.	A tone is generated and the displayed frequency is stored in the transmit frequency memory of memory channel 5.	In memory channel 5, the transmitting frequency is different from the receiving frequency.
	(5) Set in receive mode.		
5. Memory recall	(1) M. CH switch: 1 ~ 5 M. R switch: ON	Each frequency stored during step 4. (3) is displayed.	
	(2) Turn the main dial.	The frequency displayed does not vary.	M. R operation has priority.
	(3) UP/DOWN switch: ON		
	(4) M. S switch: ON		
	(5) SCAN switch: ON		
	(6) M. S switch: OFF		
	(7) M. CH switch: 5 Set in transmit mode.	The frequency stored during step 4. (4) is displayed.	
	(8) Set in receive mode. M. R switch: OFF		
6. SCAN	(1) Squelch control: MAX SCAN switch: ON	The frequency increases in increments of 25 kHz.	
	(2) Squelch control: MIN	BUSY indicator is lit and scan stops.	
	(3) Squelch control: MAX	Scan resumes.	
	(4) Set in transmit mode.	Scan stops.	
	(5) Set in receive mode. SCAN switch: ON		
	(6) HOLD switch: ON	Scan stops.	
	(7) SCAN switch: ON		
7. Memory scan	(1) M. S switch: ON	Frequencies stored in the memory during step 4. (3) are scanned.	Memory scan has priority.
	(2) Squelch control: MIN	BUSY indicator is lit and scan stops.	Scanning order 1→2→3 5←4← 1 ~ 5 continuous.
	(3) Squelch control: MAX	Scan resumes.	
	(4) Set in transmit mode.	Scan stops.	
	(5) Set in receive mode. M. S switch: OFF		
8. Switch priority	(1) M. R: ON	Memory reading	Priority 1st
	(2) M. S: ON	Memory scan	2nd
	(3) SCAN. HOLD: ON	Scanning operation	3rd
	(4) UP. DOWN: ON	UP/DOWN operation	4th
	(5) Main dial	VFO A/B	5th
	(6) M: ON	Memory entry	6th

# ADJUSTMENTS

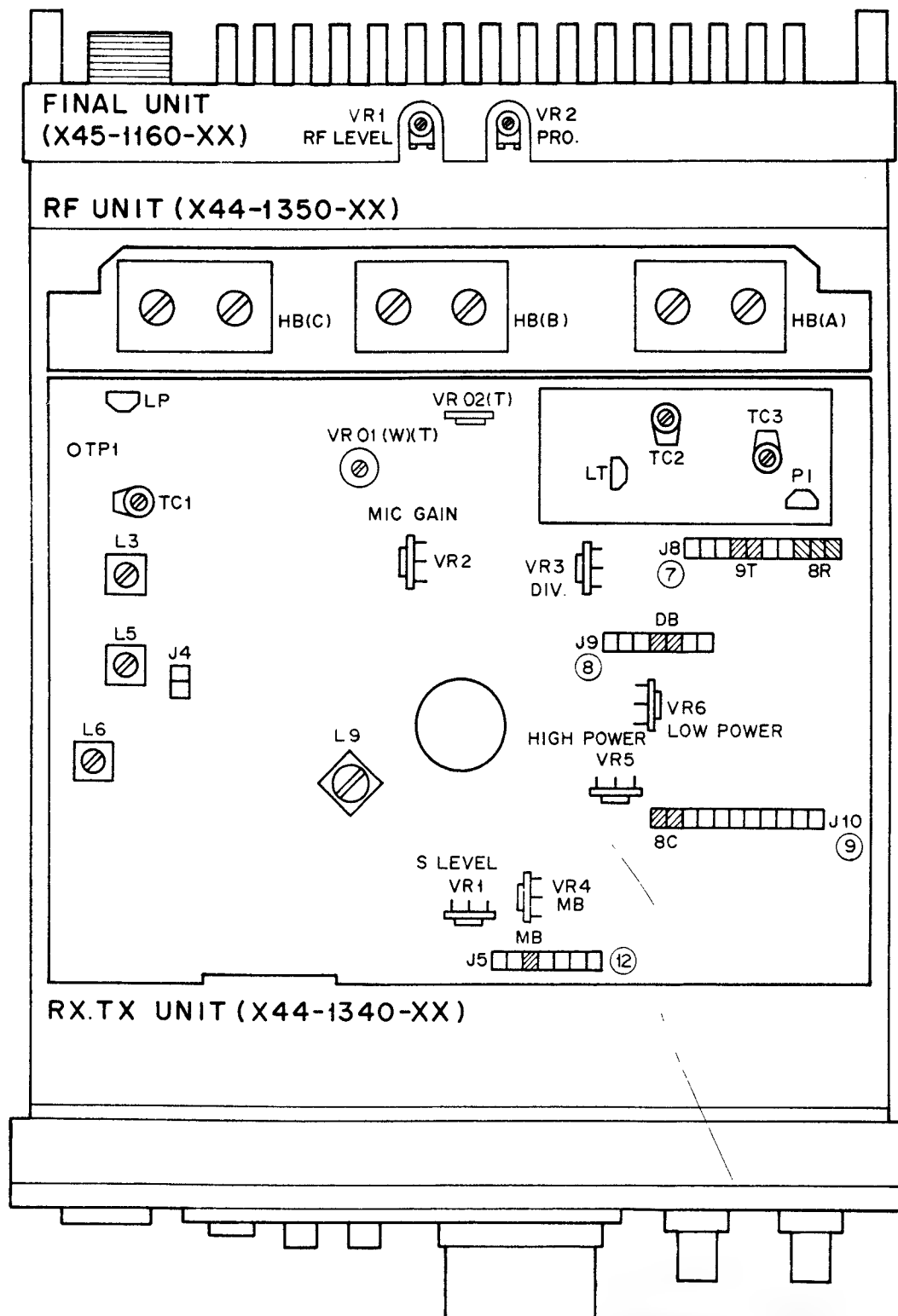
<Top View>





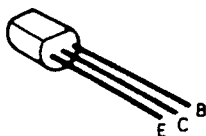
# ADJUSTMENTS

< Bottom View >

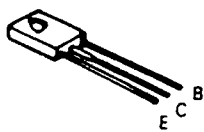


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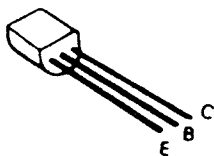
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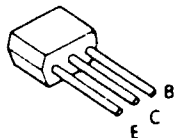
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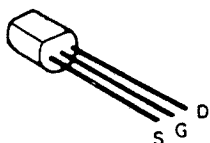
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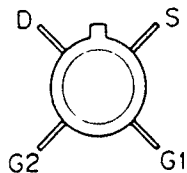
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2SC2603



2SK30A  
2SK125

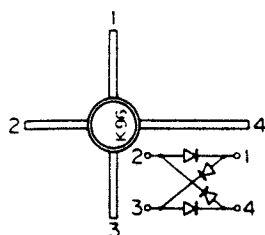


3SK48  
3SK76  
3SK92



TOP VIEW

ND487C2-3R

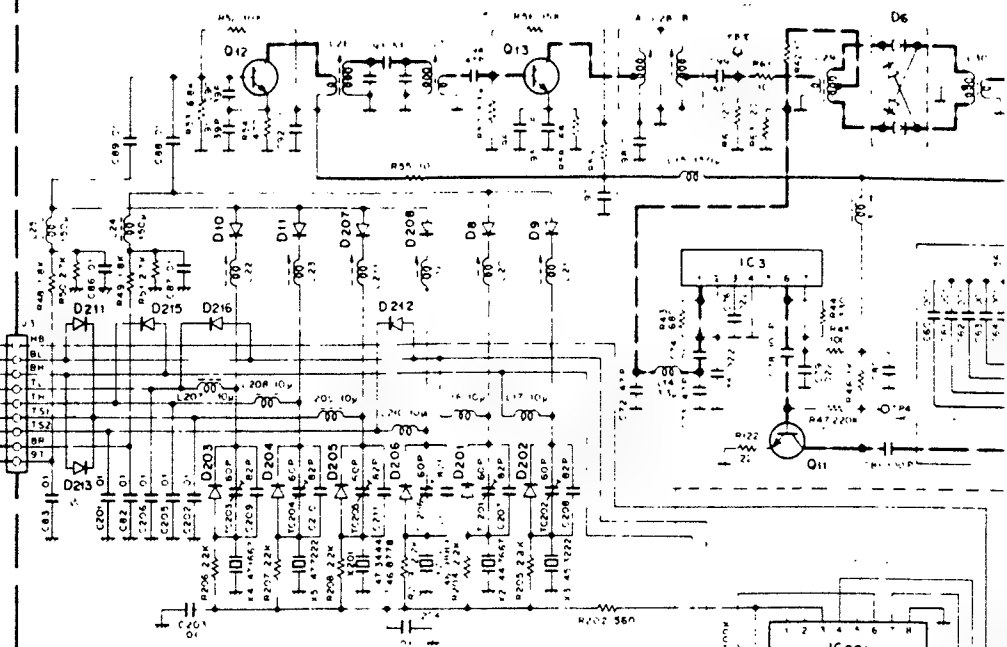


2SC460



# PLL UNIT (X50-1670-51,61)

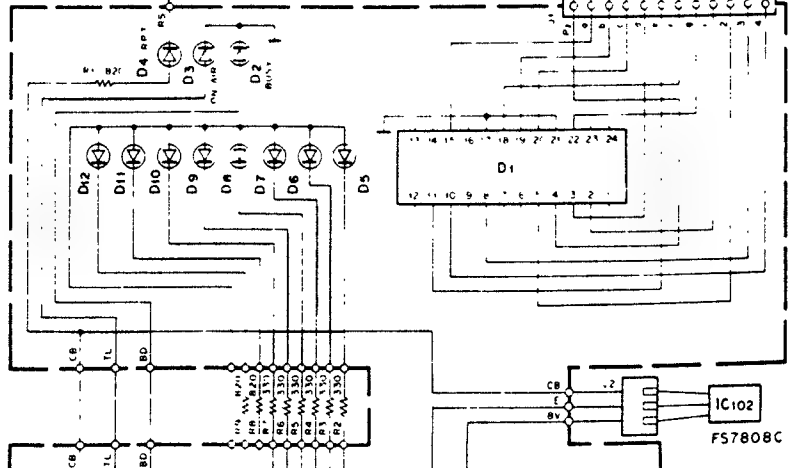
IC1 TC5081P IC4 TC9122P IC7  $\mu$ PD650C 100  
IC2 TC5082P L IC5 MN1201A IC201 TC4042BP  
IC3 TA7302P IC6 TC5022BP



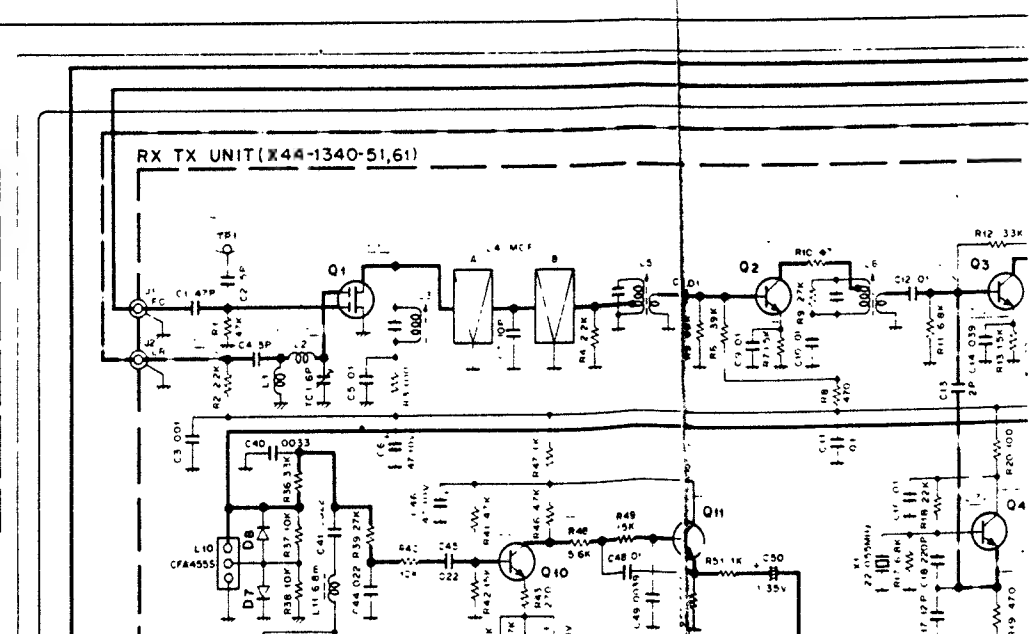
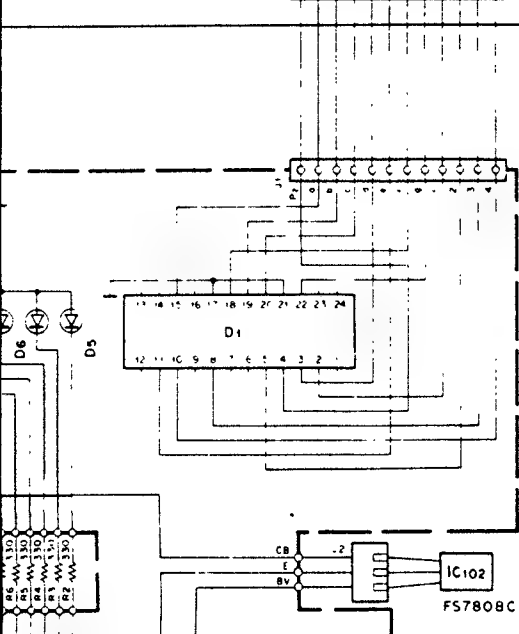
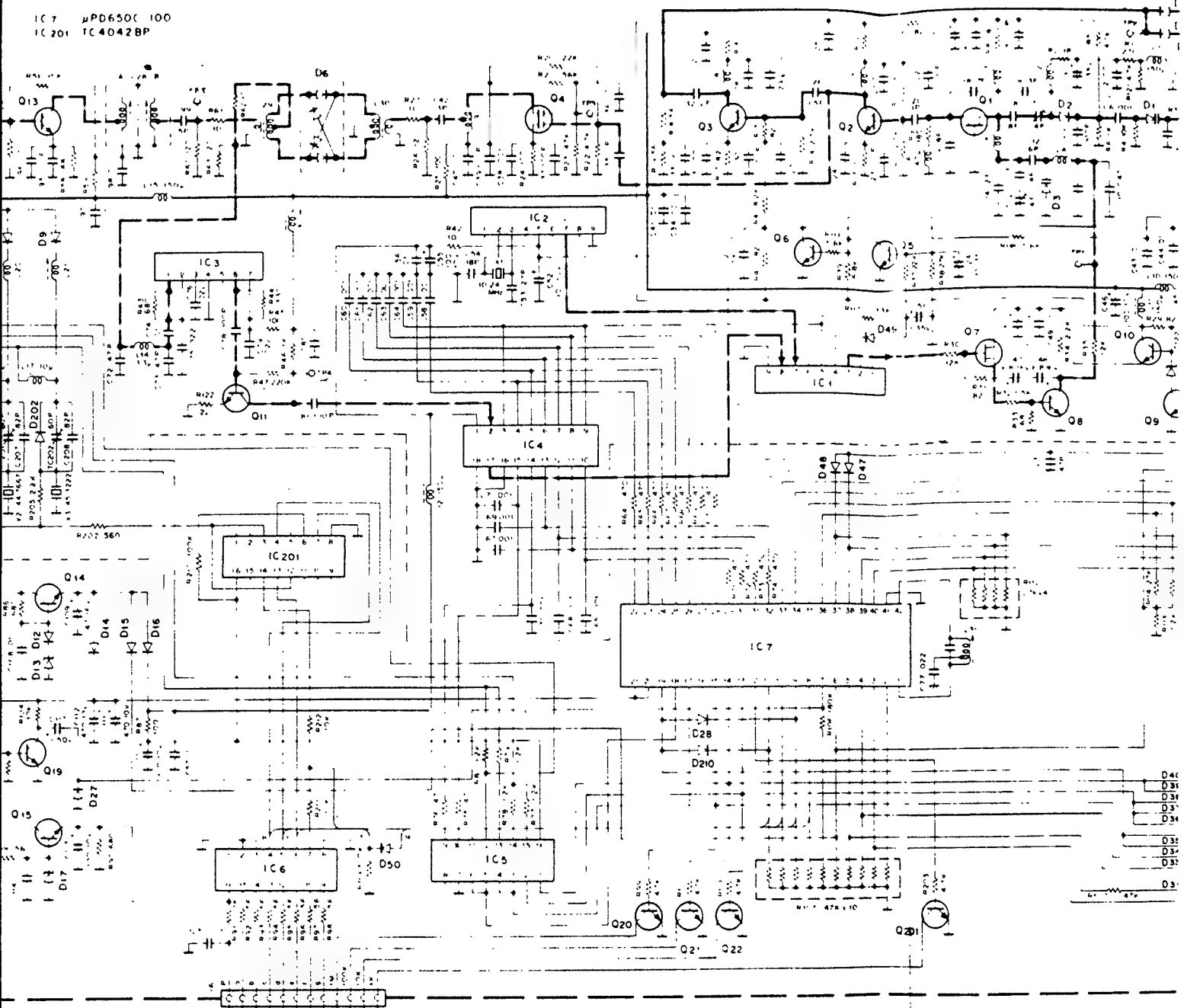
Q1 2SK125  
Q2,13 2SC2212  
Q3 2SC2026  
Q4 3SK76 or 3SK92  
Q5 2SC1775(E)  
Q6,9,10 2SC2603(D,E)  
Q7 2SK30A(O)  
Q8 2SC2240(IGR)  
Q11,12 2SC1923(O)  
Q14,20~22,201 2SC1959(Y)  
Q15 2SC496(Y)  
Q19 2SC1815(Y)

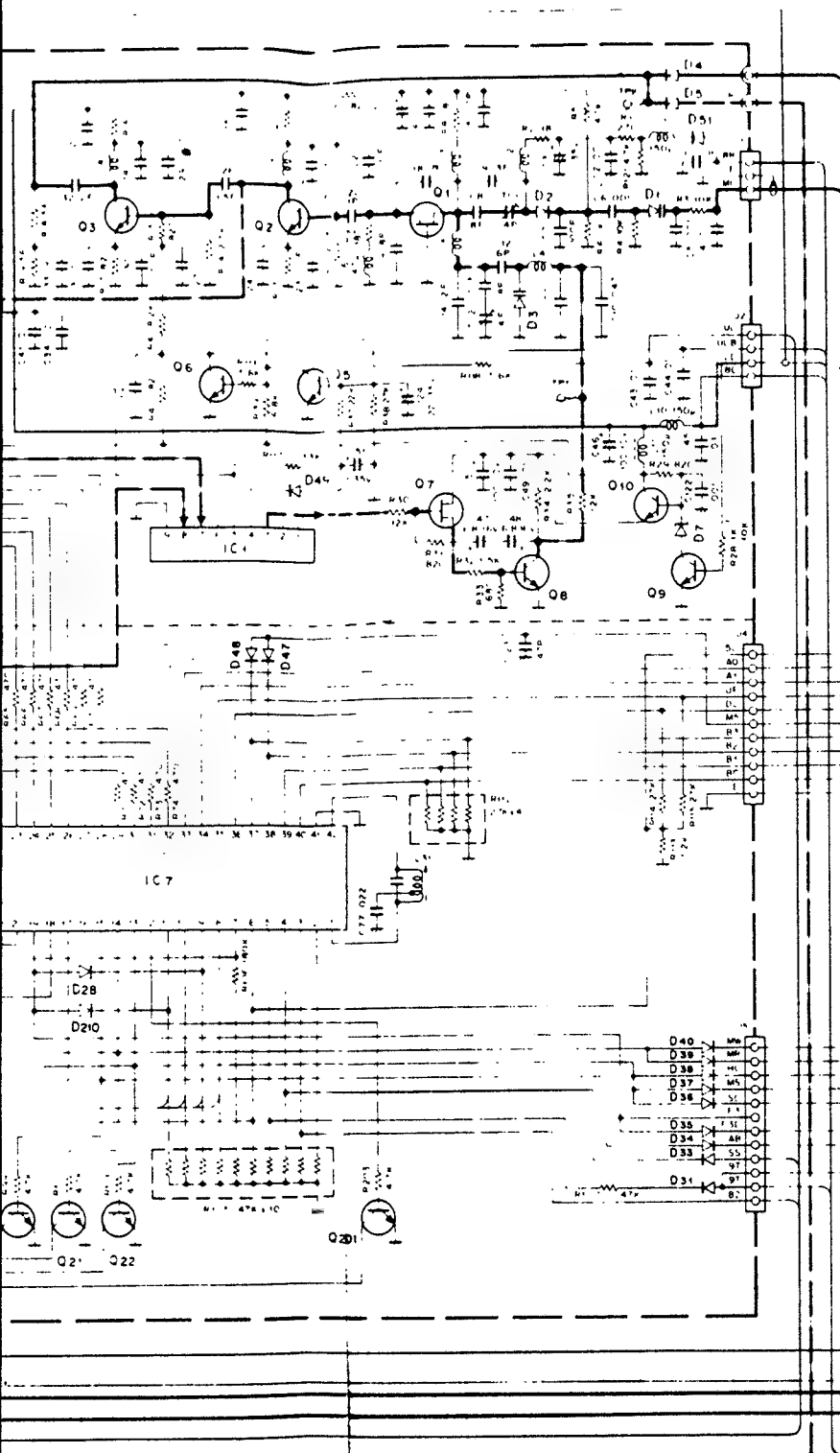
D1 1S2208  
D2 MI301  
D3 1SV505  
D4,5 BA243S  
D6 ND487C2-3R  
D7 XZ-062  
D8~11,207,208 BA244A  
D12,14~16,27,31,51,211,212,213  
215,216 1S1555  
D13,17 XZ-066  
C26 MA522(O)  
D28,33~40,47~50,210  
IN60  
D201~206 1S2588

## INDICATOR UNIT (X54-1520-00)

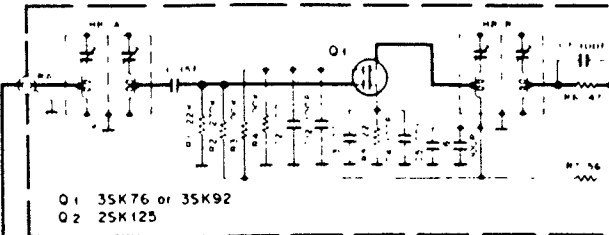


IC 7  $\mu$ PD650C 100  
IC 201 TC4042BP

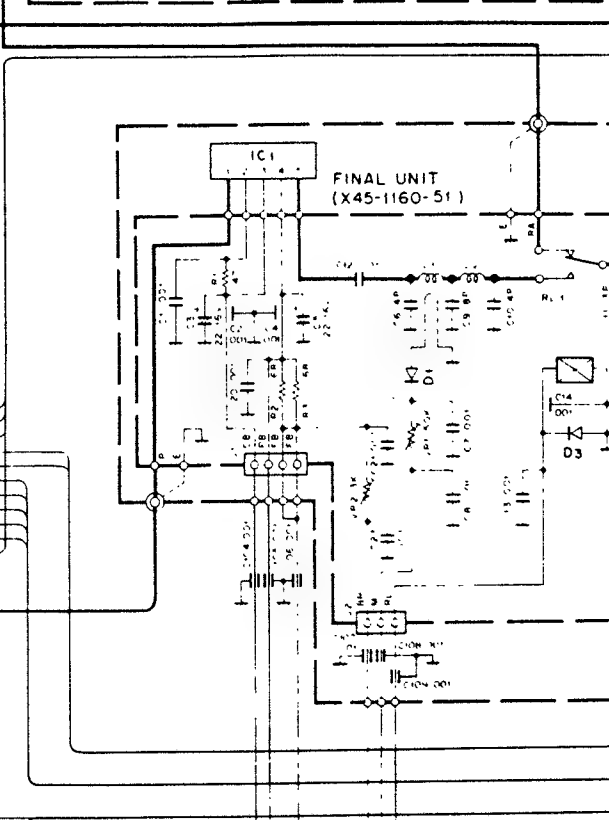




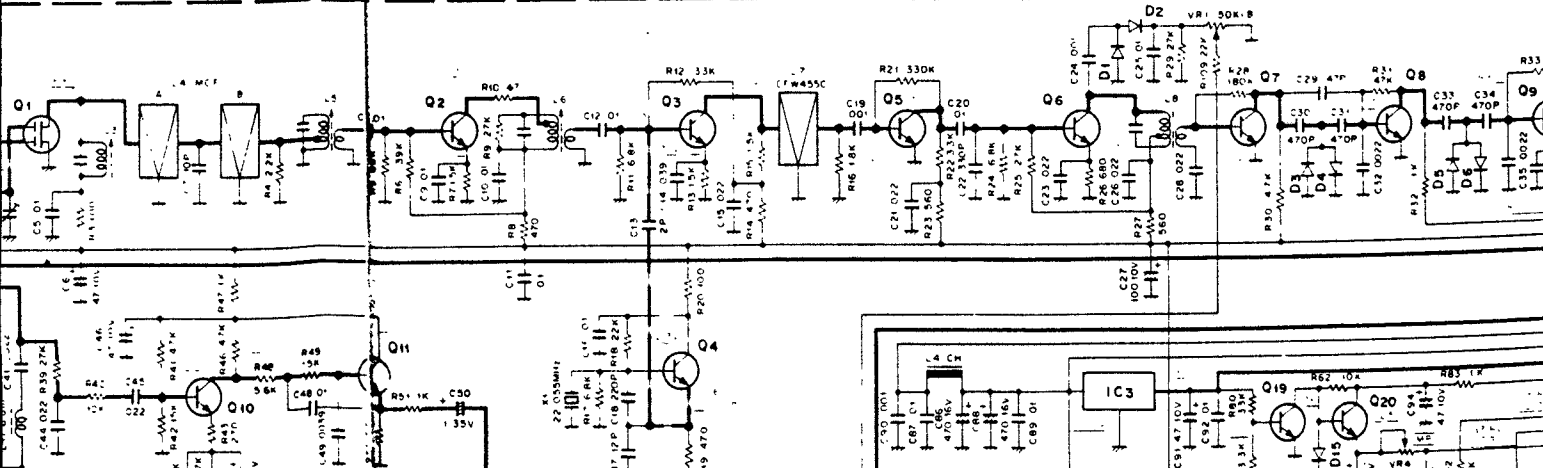
RF UNIT (X44 1350 00)



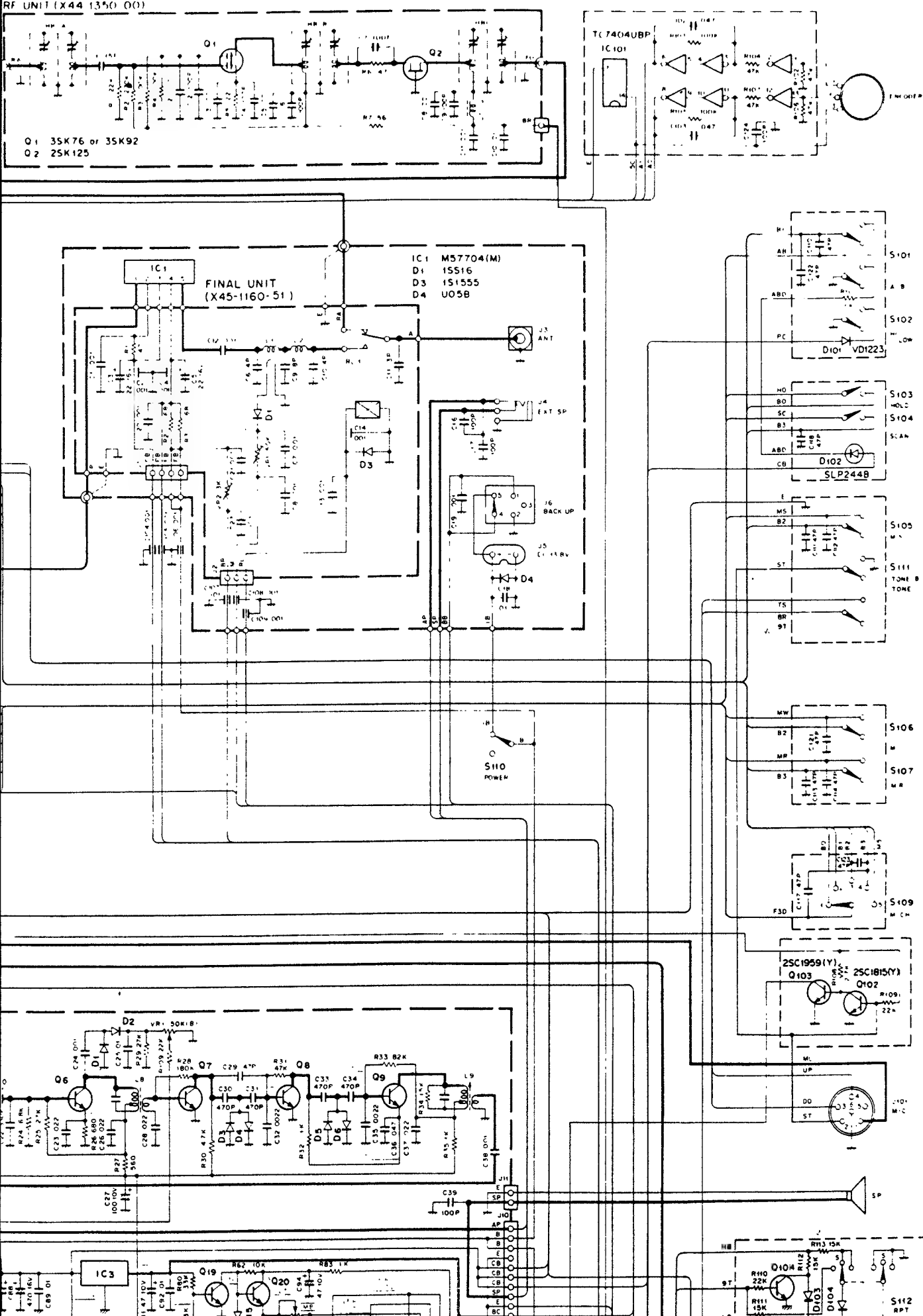
FINAL UNIT (X45-1160-51)



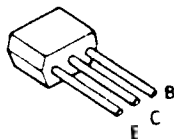
340-51,61)



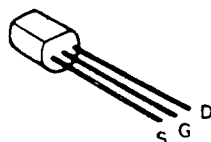
## RF UNIT (X44 1350 00)



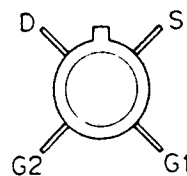
2SA1115  
2SC2603



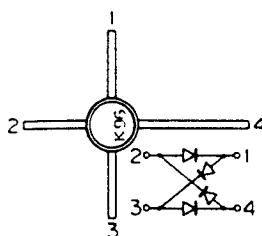
2SK30A  
2SK125



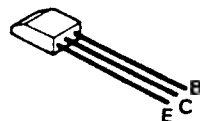
3SK48  
3SK76  
3SK92



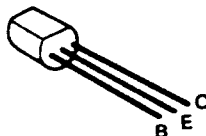
TOP VIEW  
ND487C2-3R



2SC460



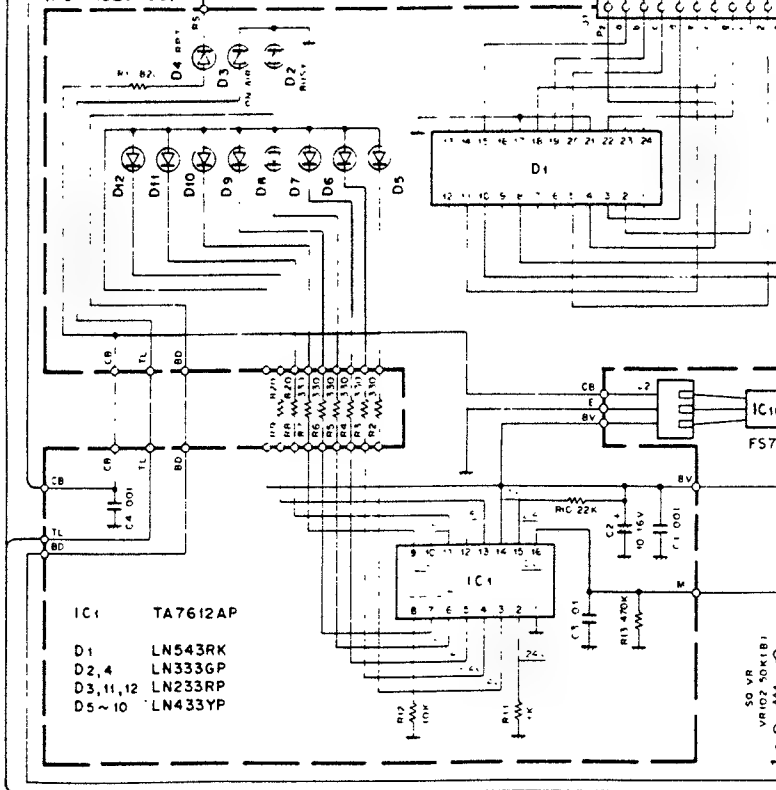
2SC2026  
2SC2407



Q1 2SK125  
Q2,13 2SC2212  
Q3 2SC2026  
Q4 3SK76 or 3SK92  
Q5 2SC1775(E)  
Q6,9,10 2SC2603(D,E)  
Q7 2SK30A(O)  
Q8 2SC2240(GR)  
Q11,12 2SC1923(O)  
Q14,20~22,201 2SC1959(Y)  
Q15 2SC496(Y)  
Q19 2SC1815(Y)

D1 1S2208  
D2 MI301  
D3 1SV505  
D4,5 BA2435  
D6 ND487C2-3R  
D7 XZ-062  
D8~11,207,208 BA244A  
D12,14~16,27,31,51,211,212,213,215,216 1S1555  
D13,17 XZ-066  
D26 MA522(Q)  
D28,33~40,47~50,210 1N60  
D201~206 1S2588

INDICATOR UNIT  
(X54-1520-00)



T(-51)	RO10	CO11	CO13	VR02	DO2
W1-61	-	JUMPER	-	-	JUMPER

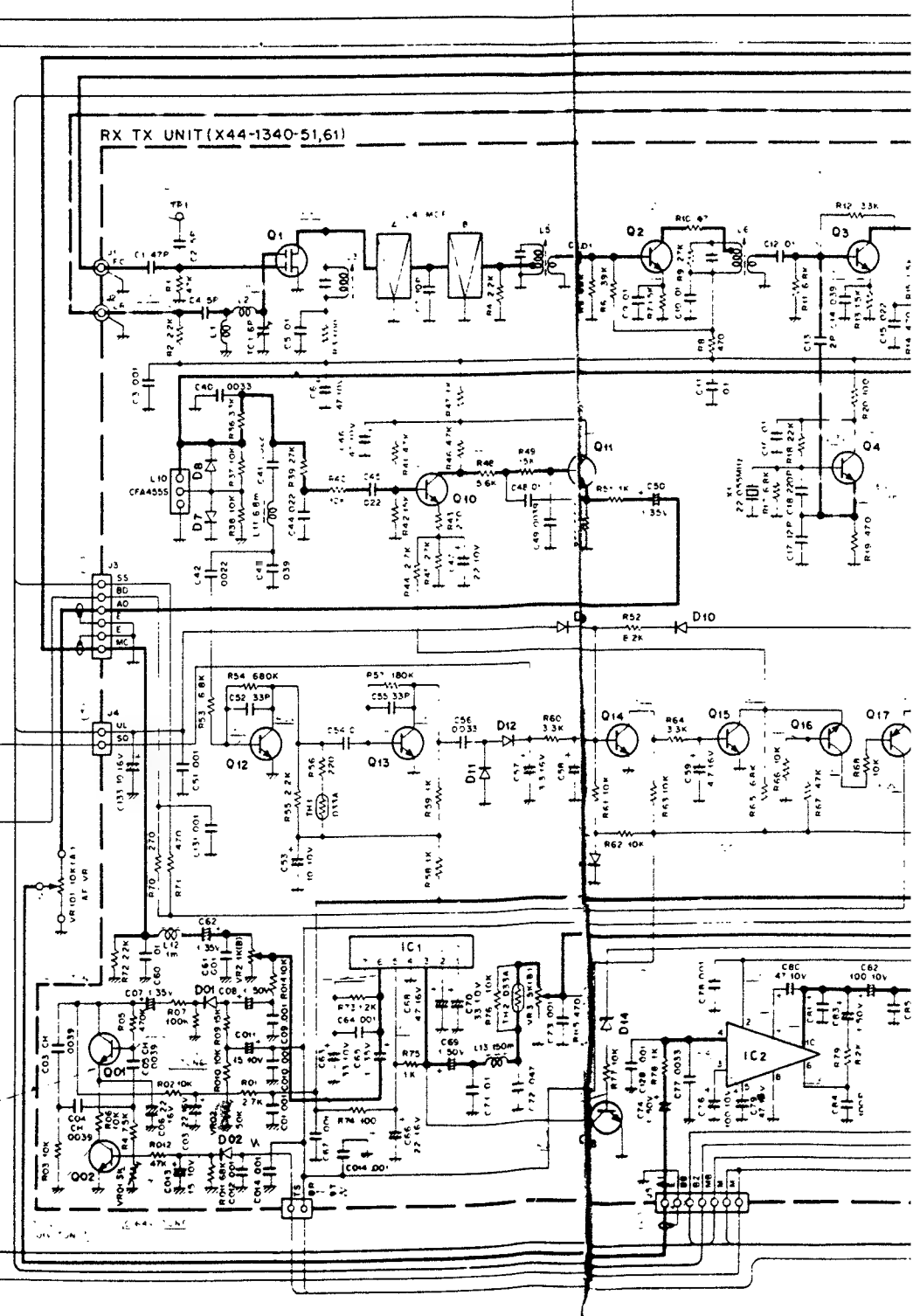
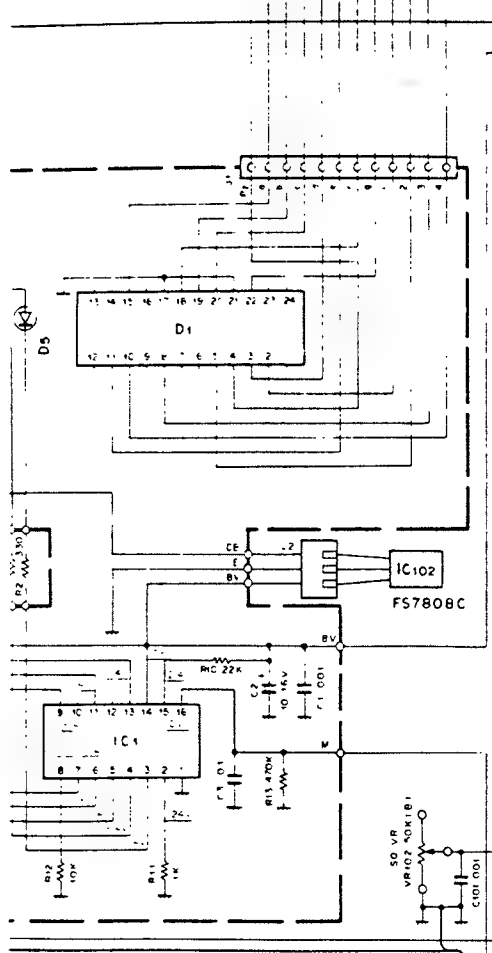
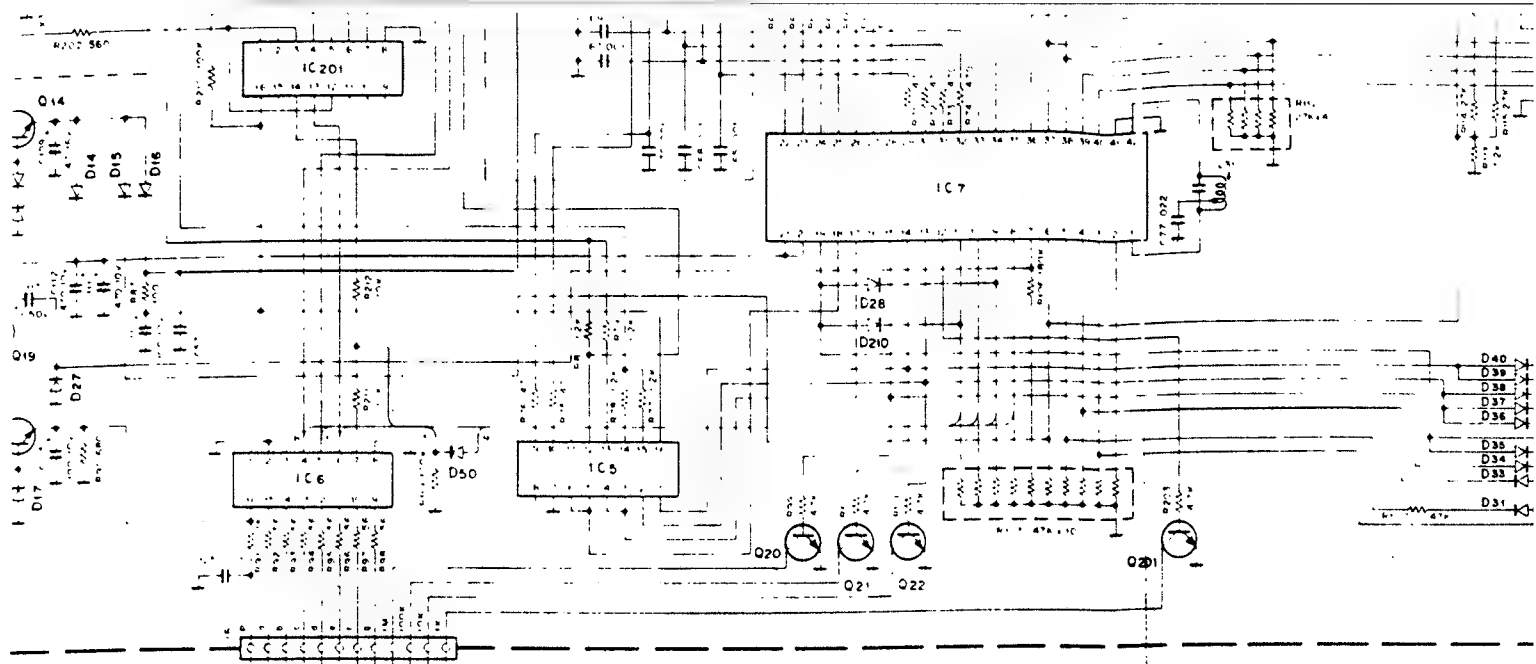
RX,TX UNIT

— Signal  
- - - Control  
— Common DC line

Q1 3SK48  
Q2,3 2SC1923(O)  
Q4~9 2SC460(B)  
Q10,12,13,19,20,27,28 2SC1815(Y)  
Q11,14~16,18,26 2SC2603(E)  
Q17,31,32 2SA1115(E)  
Q21,23 2SC496(Y)  
Q22,25 2SA1015(Y)  
Q24 2SC1959(Y)  
Q29 2SC2026  
Q30 2SC2407  
Q01,02 2SC4588

D1,2,11,12 1N60  
D3~6,9,10,15,19,21,2 1S1555  
D7,8 1S516  
D13 1S1212  
D14 WZ-040  
D16 XZ-066  
D17 XZ-070  
D18 WZ-100  
D20 XZ-094  
D22 XZ-060

IC1 TA7061AF  
IC2 HA1366W  
IC3 μPC78L0

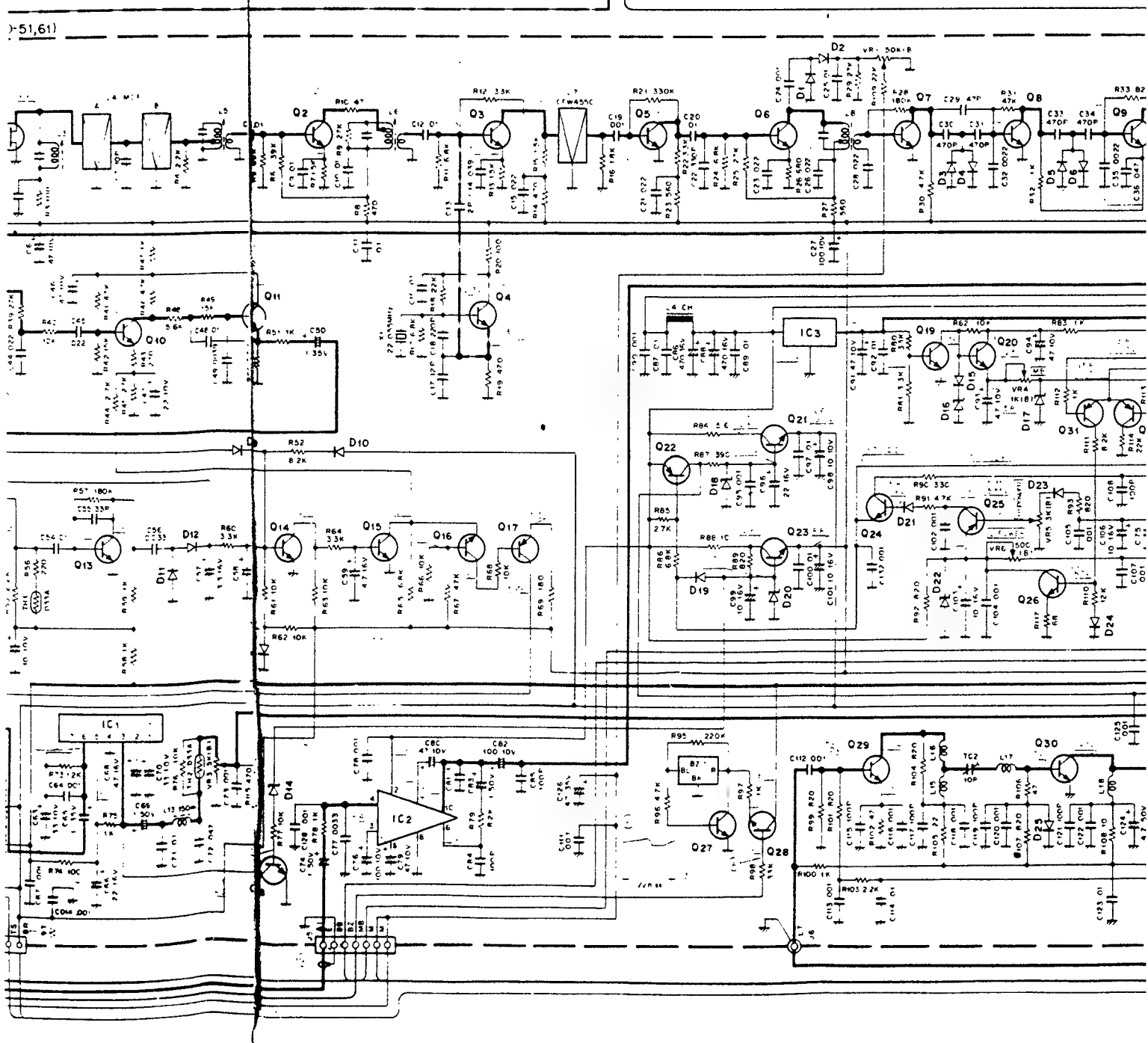
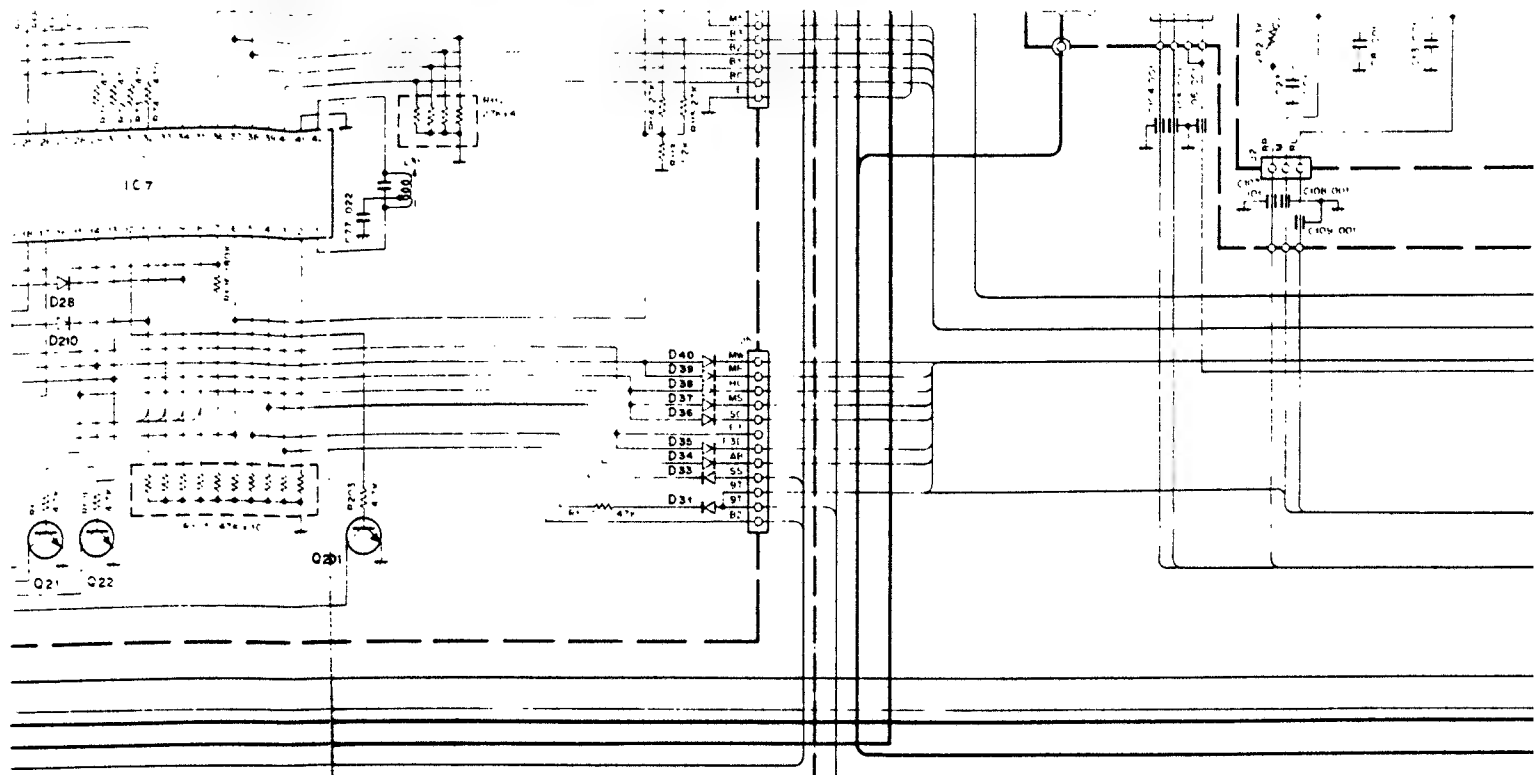


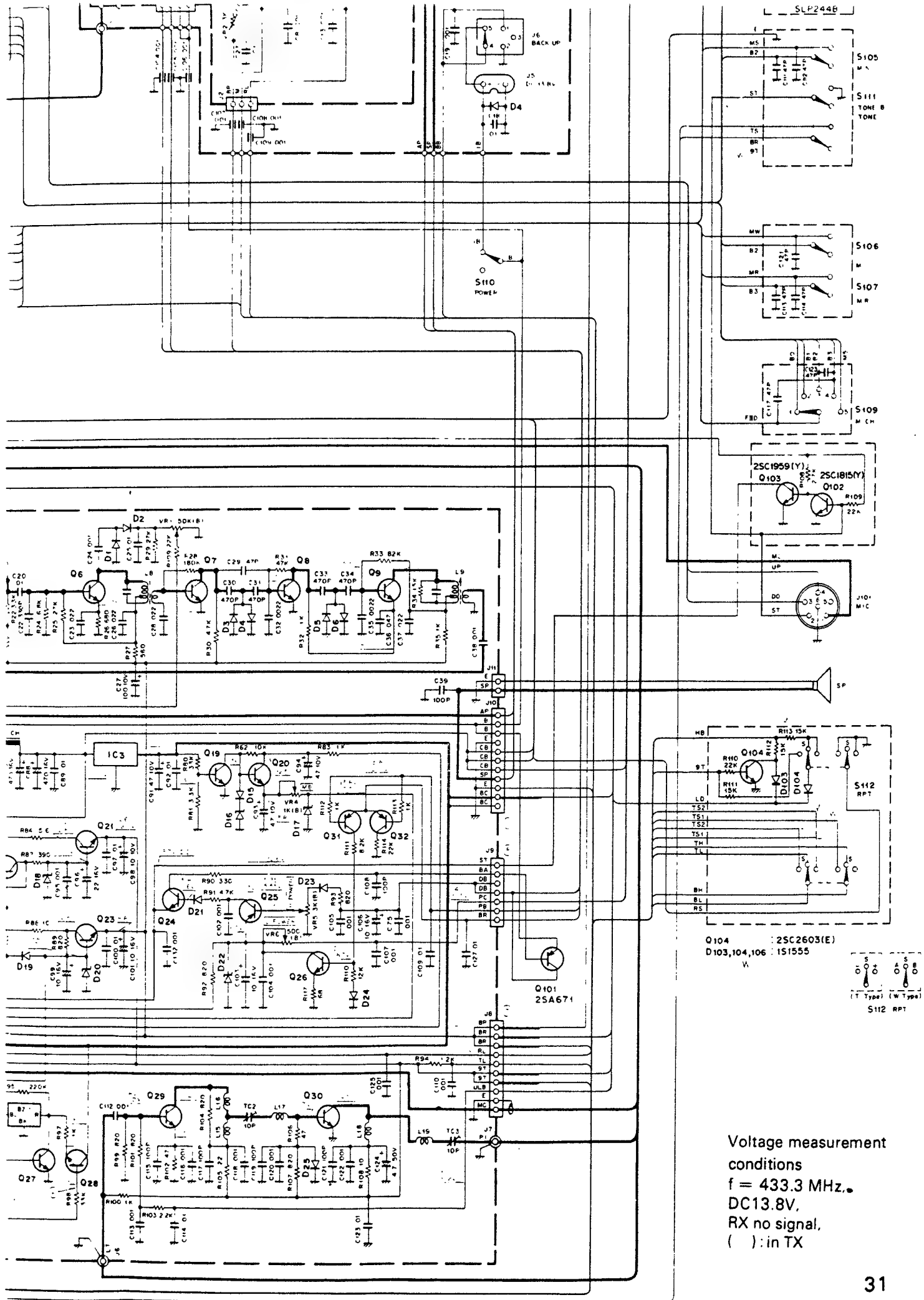
T(-51)	ROX	CO1	CO13	VR02	DO2
W(-61)	JUMPER				JUMPER

RX, TX UNIT

- 3SK48
- 25C1923(O)
- 25C466(B)
- 2,13,19,20,27,28
- 25C1815(Y)
- 25C2603(E)
- 51,32
- 25A1115(E)
- 23
- 25C496(Y)
- 25
- 25A1015(Y)
- 25C1959(Y)
- 25C2026
- 25C2407
- 25C4588
- D1,2,11,12 1N60
- D3-6,9,10,15,19,21,23-25,01,02 1S1555
- D7,8 1SS16
- D13 1S1212
- D14 WZ-040
- D16 XZ-066
- D17 XZ-070
- D18 WZ-100
- D20 XZ-094
- D22 XZ-060
- IC1 TA7061AP
- IC2 HA1366W
- IC3 MPC78L08A







## SPECIFICATIONS

## [POWER SUPPLY SECTION]

**Power Requirement:** AC 120V  $\pm 10\%$  or 220V  $\pm 10\%$  (K)  
AC 240V  $\pm 10\%$  or 220V  $\pm 10\%$  (W)(T)(X)  
50 ~ 60 Hz

**Power Consumption:** 80W (approx.)

**Output Voltage:** DC 13.8V (standard)

**Output Current:** Intermittent 3.5A (duty cycle 50%), Continuous 3A (max.)

**Fluctuation:** Less than  $\pm 50$  mV [against an input AC voltage variation of 120/220V  $\pm 10\%$  (K), 220/240V  $\pm 10\%$  (W)(T)(X)]

**Ripple Component:** Less than 5 mV (r.m.s.) [at 3.5A output current, AC 120/220V (K), 220/240V (W)(T)(X)]

**Dimensions:** 147 wide  $\times$  73 high  $\times$  180 deep (mm)

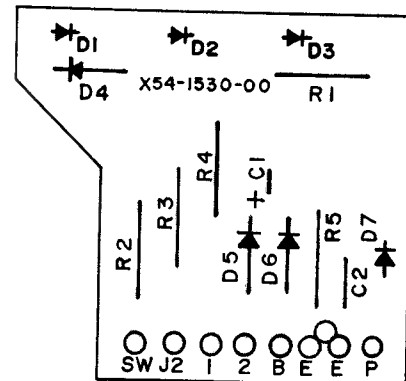
**Weight:** 3.3 kg (approx.)

## [SPEAKER SECTION]

**Impedance:** 8 ohms

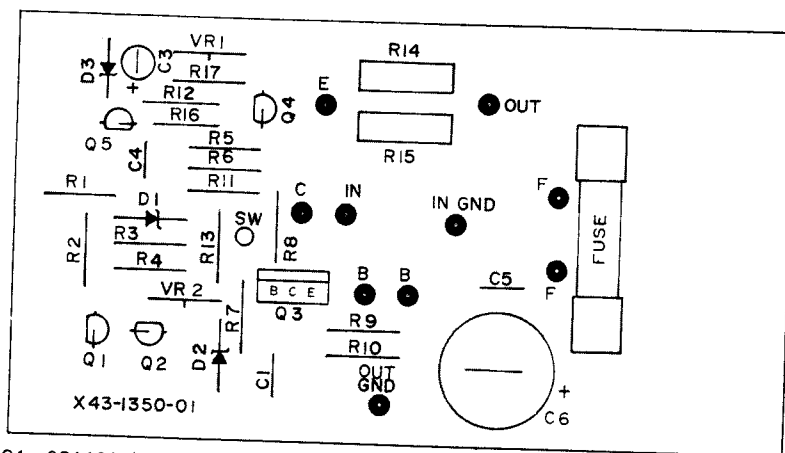
The above specifications are subject to change without notice for further improvement.

## ▼ INDICATOR UNIT (X54-1530-00)



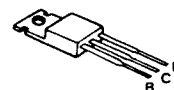
D1. TLR-205 D2. TLY-205  
D3. TLG-205 D4. WZ-130  
D5 ~ D7. 1S1555 D7. 1S1555 or 1N4448

## ▼ AVR unit (X43-1350-01)

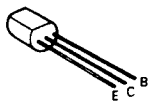


Q1: 2SA1015(Y) Q2: 2SC1959(Y) Q3: 2SA473(Y) Q4: 5. 2SC1815(Y)  
D1, 3: XZ-060 D2: XZ-137

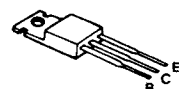
2SD525



2SA1015  
2SC1815  
2SC1959



2SA473



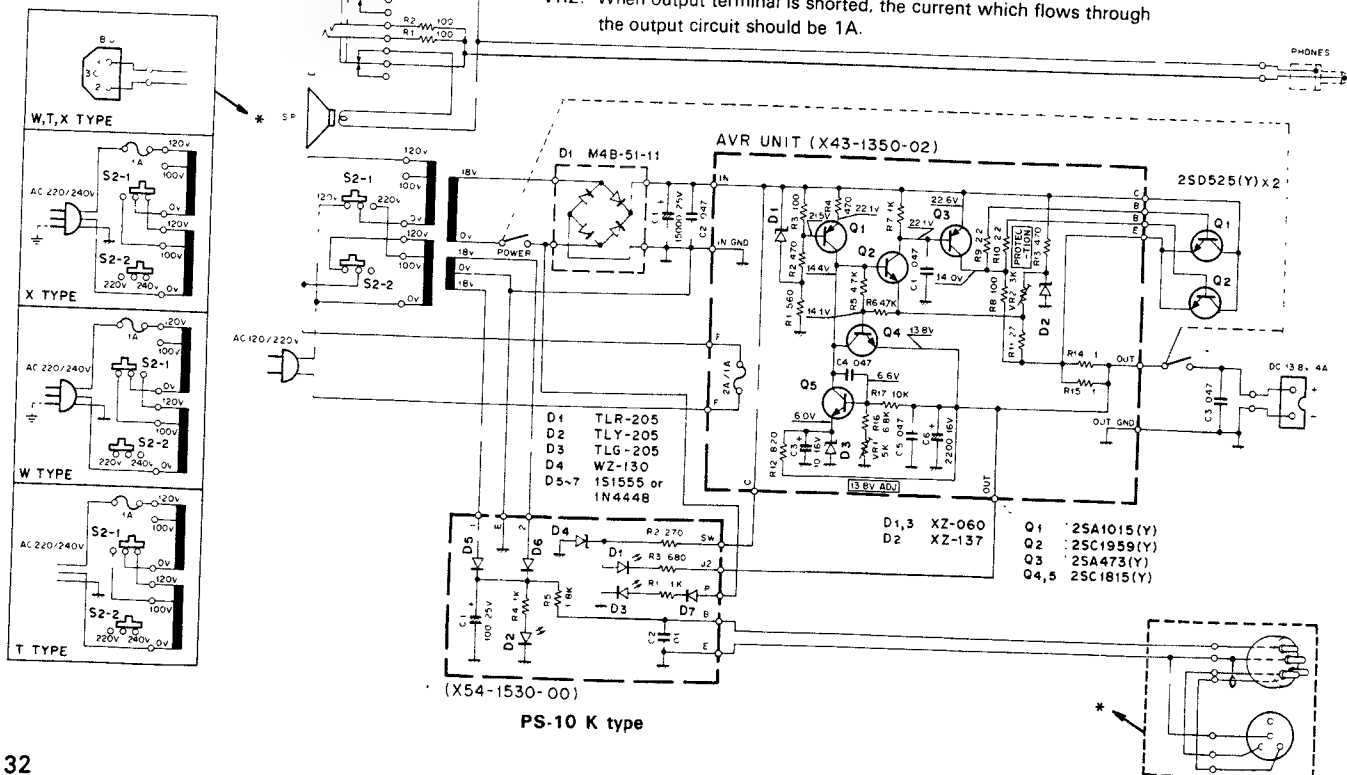
TLG, R, Y-205



## Adjustment

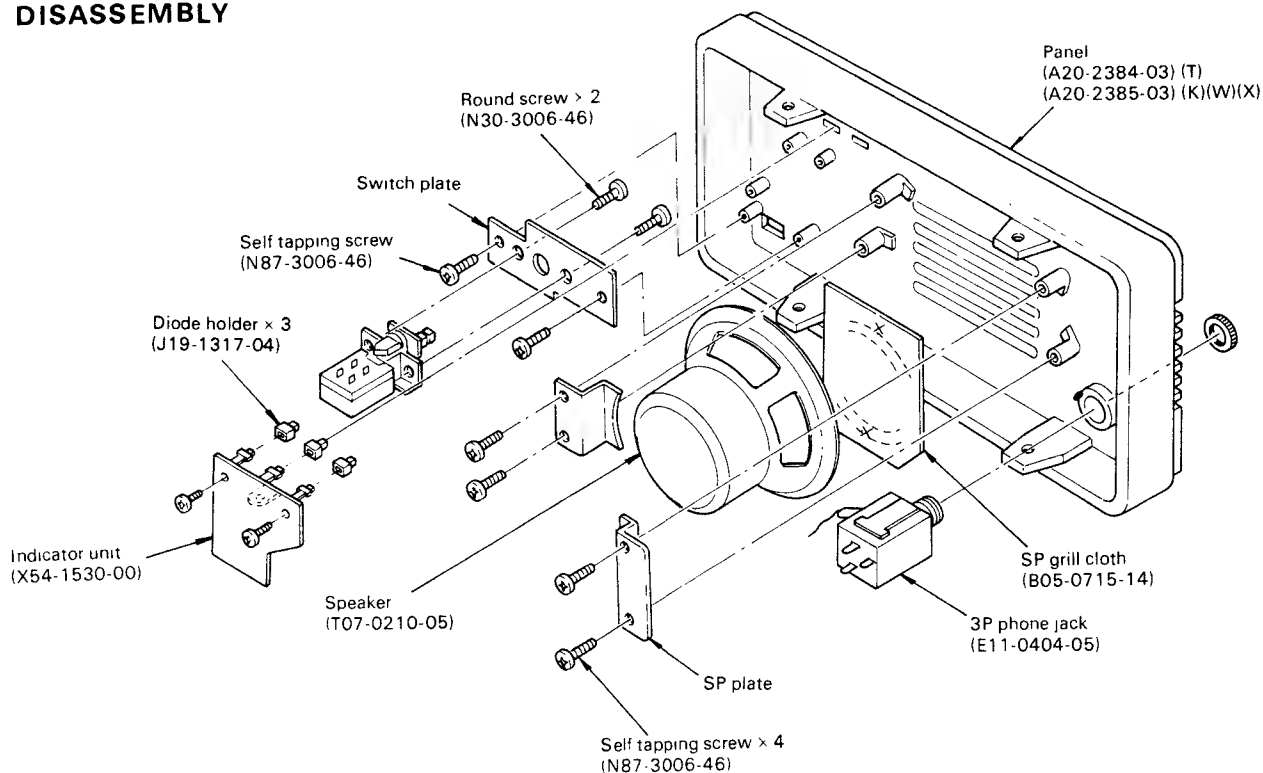
VR1 Set to 13.8  $\pm 0.1$ V.

VR2. When output terminal is shorted, the current which flows through the output circuit should be 1A.

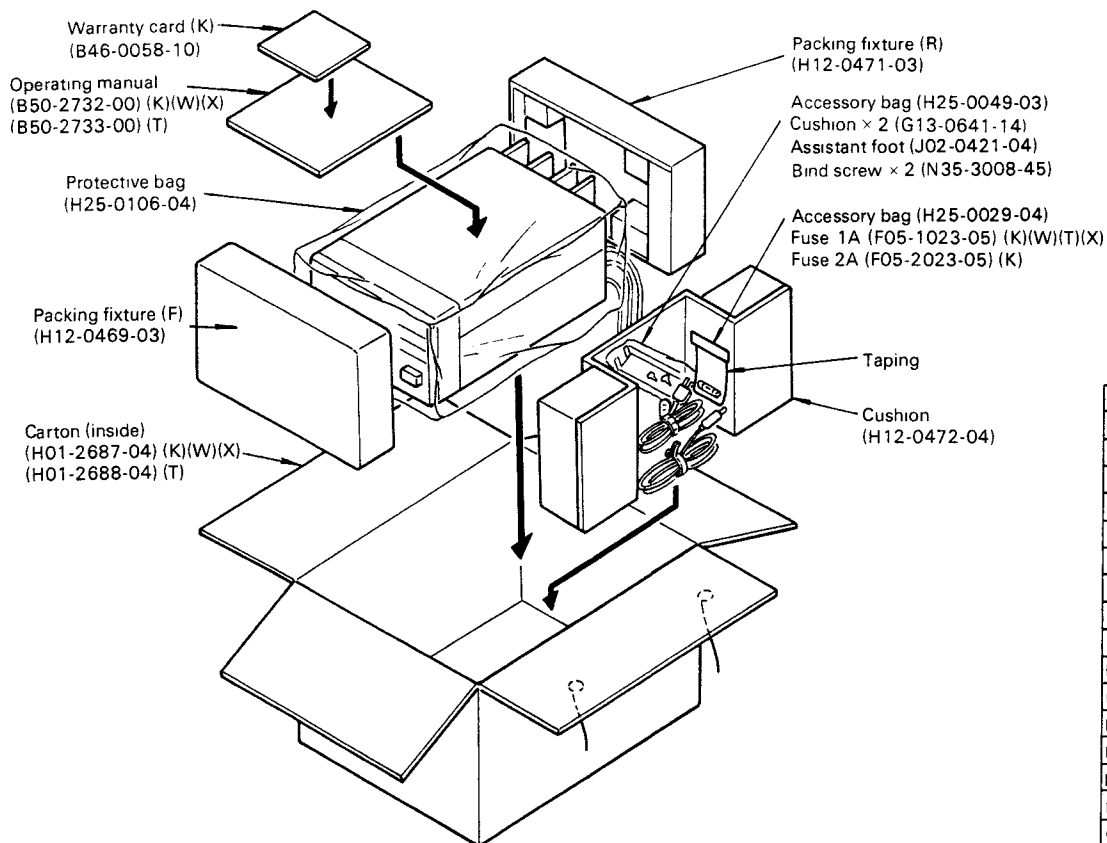


# PS-10

## DISASSEMBLY



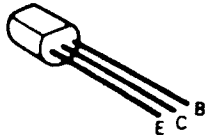
## PACKING



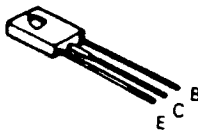
Refer to PLL unit  
(X50-1670-11, 71)

	K(-11)	X(-71)
X 2	45.8778	44.7667
X 3	46.4333	45.3222
X 4	48.2778	47.1667
X 5	48.8338	47.7222
X201	—	46.9889
R202	1K	720
R204	1.2K	1.8K
R205	1.2K	1.8K
R206	1.2K	1.8K
R207	1.2K	1.8K
R208	—	1.8K
D205	—	1S2588
D207	—	BA244A
D211	—	1S1555
D215	—	1S1555
C 9	2P	3P
C 14	1P	2P
C202	—	.01
C211	—	82P
L209	—	10μ
L211	—	L32-0627-05
TC205	—	60P

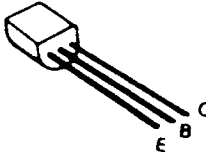
2SA1015  
2SC1775  
2SC1815  
2SC1923  
2SC1959  
2SC2240



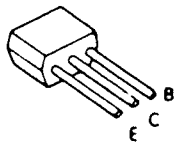
2SC496



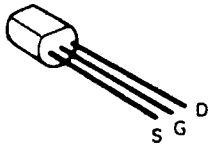
2SC2212



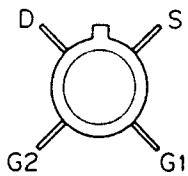
2SA1115  
2SC2603



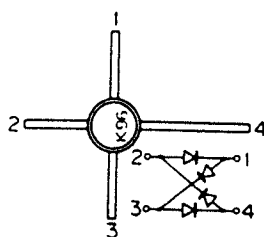
2SK30A  
2SK125



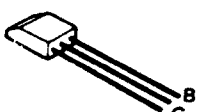
3SK48  
3SK76  
3SK92



TOP VIEW  
ND487C2-3R

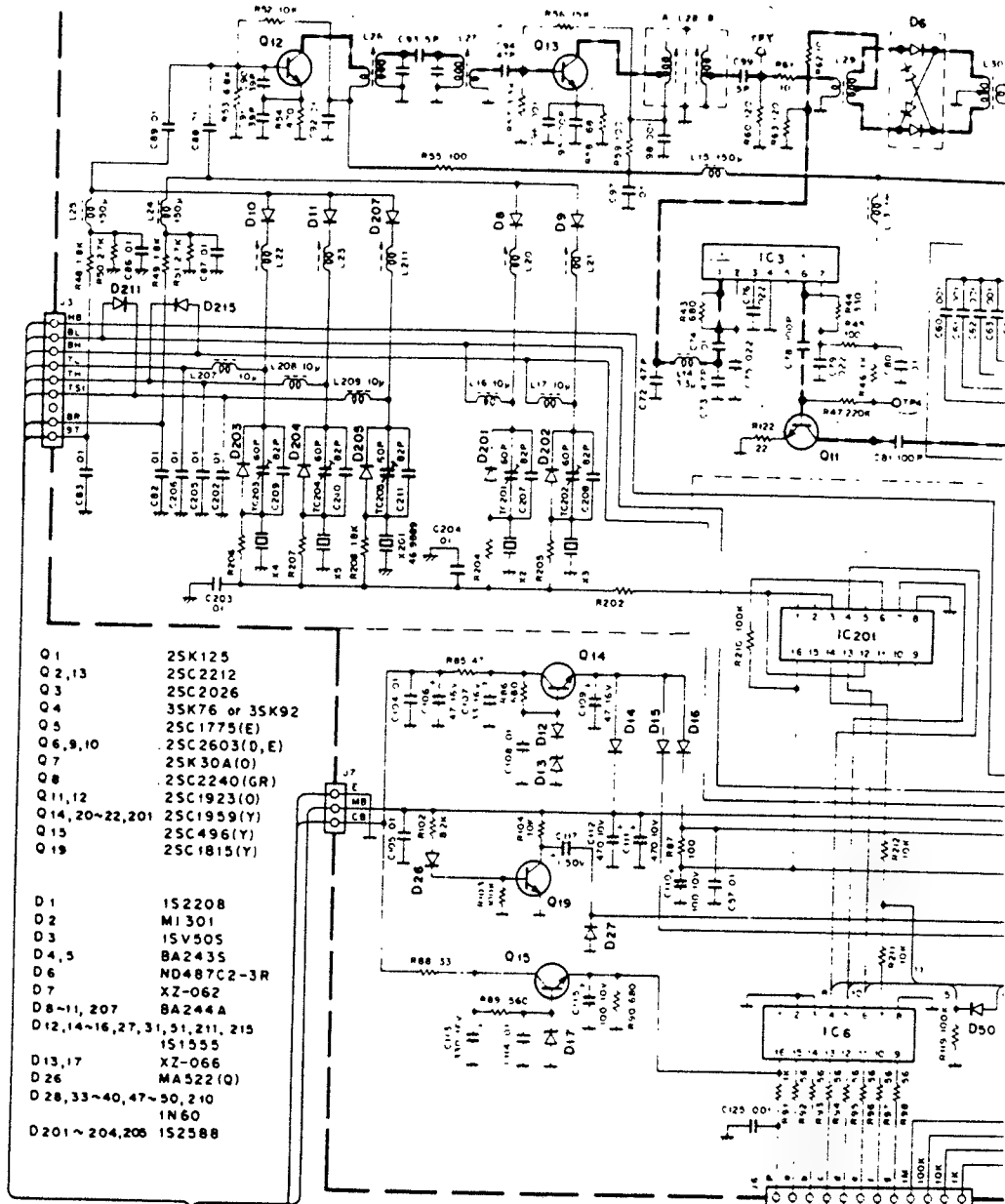


2SC460



# PLL UNIT (X50-1670-11, -71)

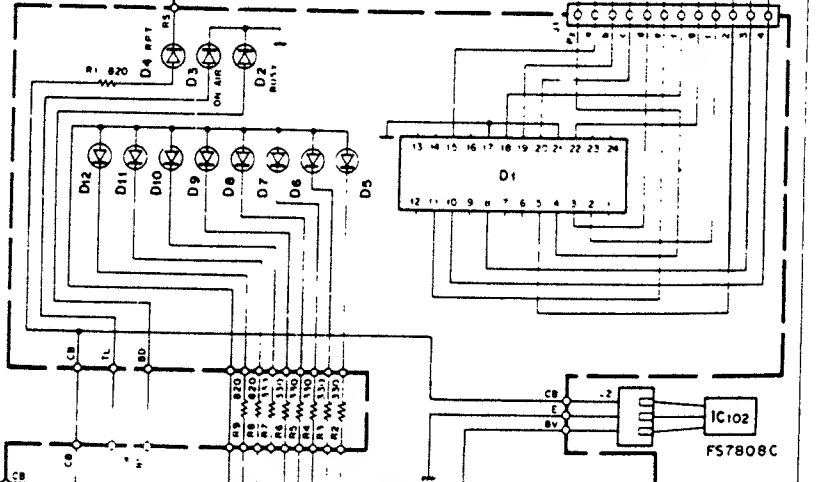
IC1 TC5081P IC4 TC9122P IC7  $\mu$ PD650C-100  
IC2 TC5082P-L IC5 MN1201A IC201 TC4042BP  
IC3 TA7302P IC6 TC5022BP



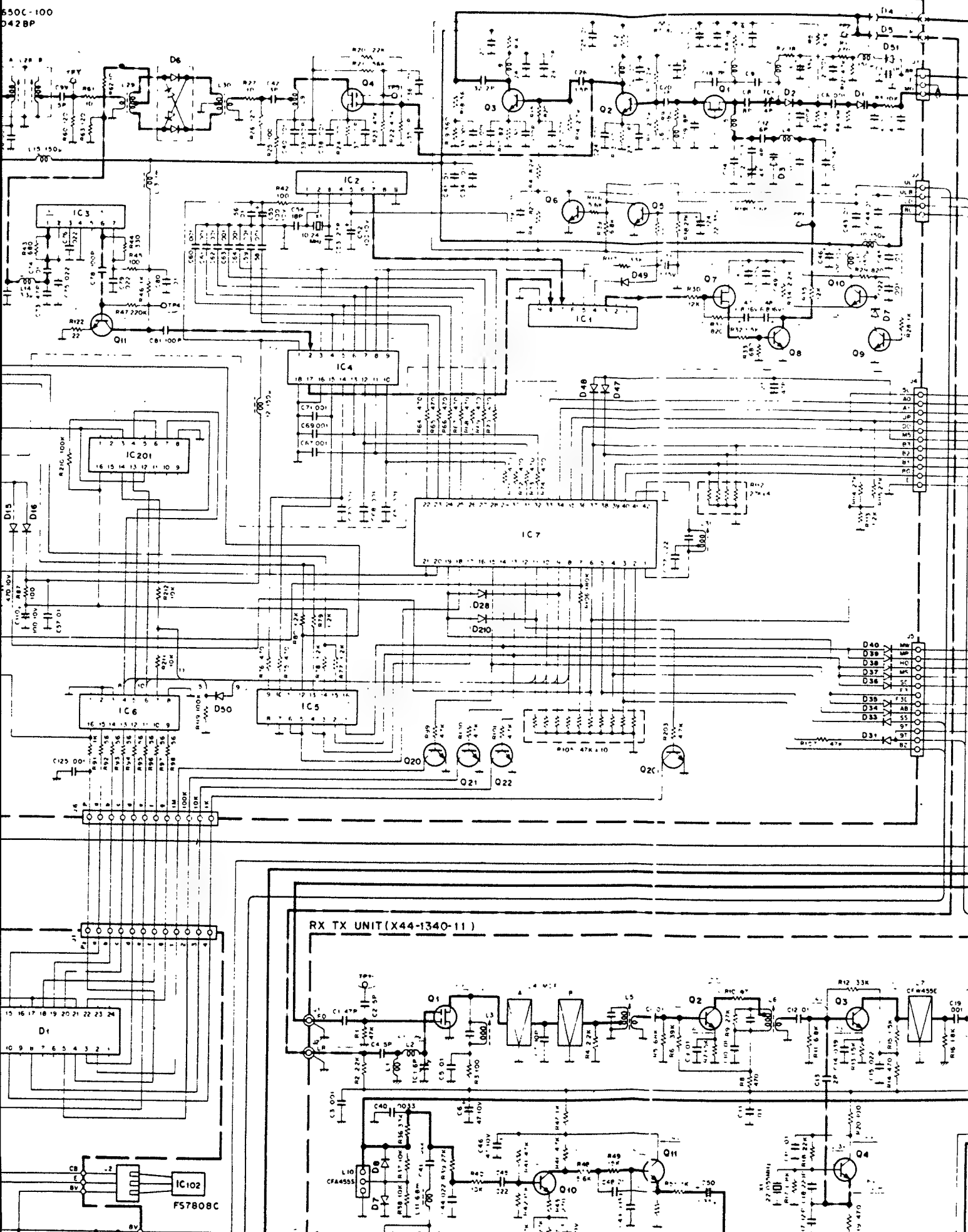
Q1 2SK125  
Q2,13 2SC2212  
Q3 2SC2026  
Q4 3SK76 or 3SK92  
Q5 2SC1775(E)  
Q6,9,10 2SC2603(D,E)  
Q7 2SK30A(O)  
Q8 2SC2240(GR)  
Q11,12 2SC1923(O)  
Q14,20~22,201 2SC1959(Y)  
Q15 2SC496(Y)  
Q19 2SC1815(Y)

D1 1S2208  
D2 MI301  
D3 1SV505  
D4,5 BA243S  
D6 ND487C2-3R  
D7 XZ-062  
D8~11,207 BA244A  
D12,14~16,27,31,51,211,215 1S1555  
D13,17 XZ-066  
D26 MA522(Q)  
D28,33~40,47~50,210 1N60  
D201~204,206 1S2588

## INDICATOR UNIT (X54-1520-11)



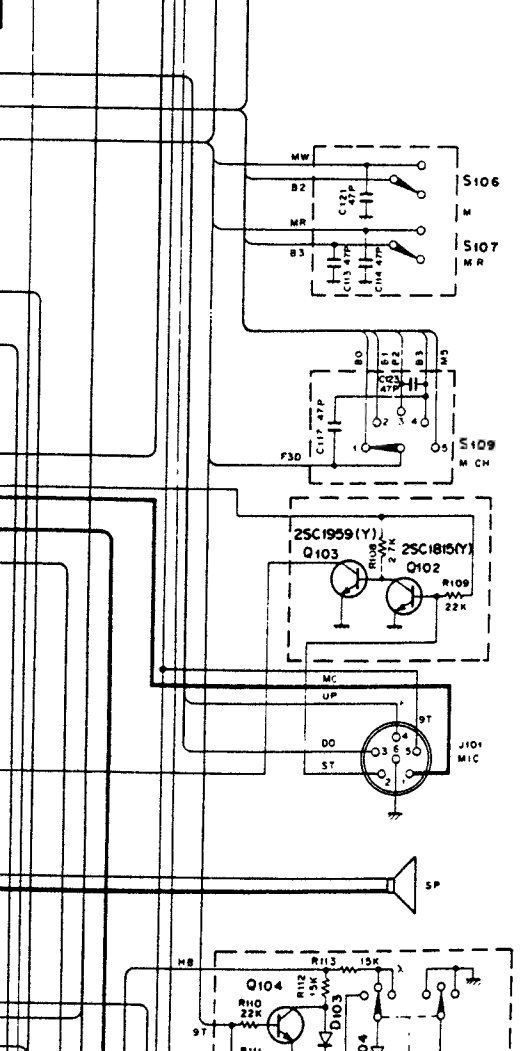
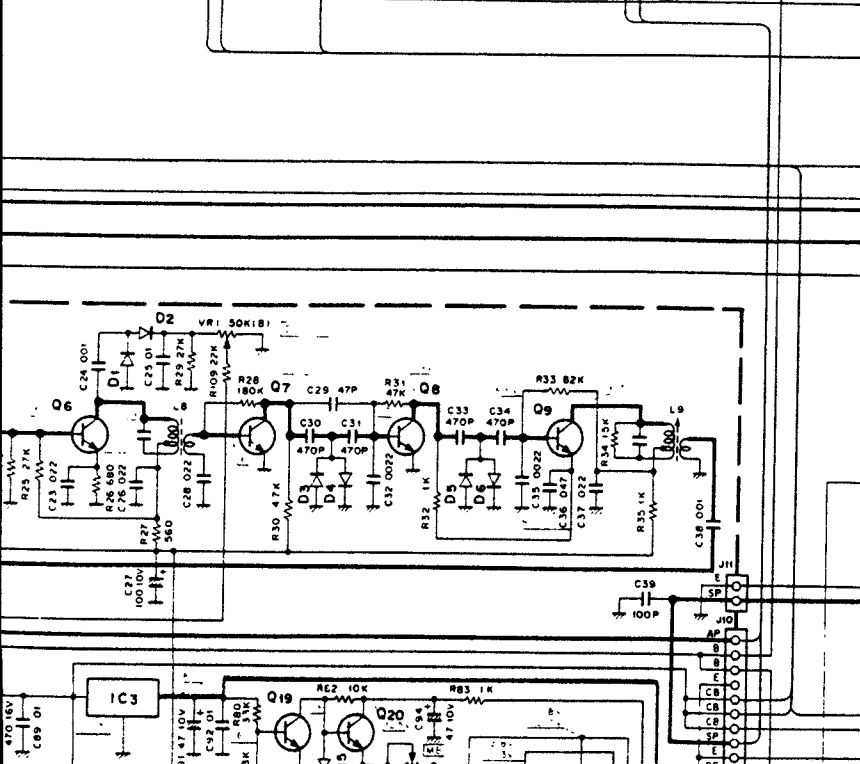
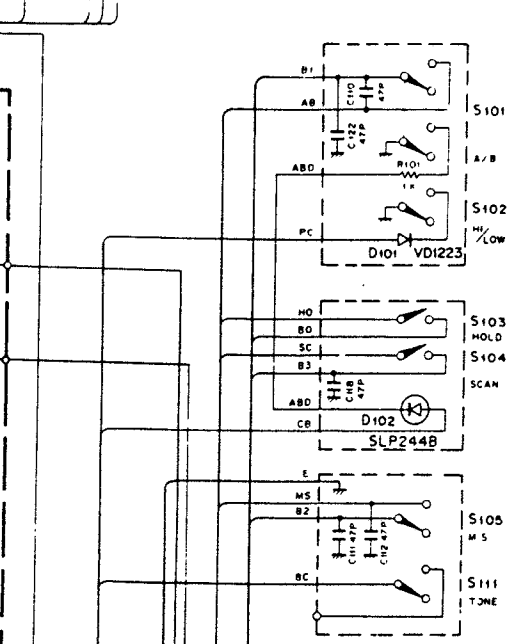
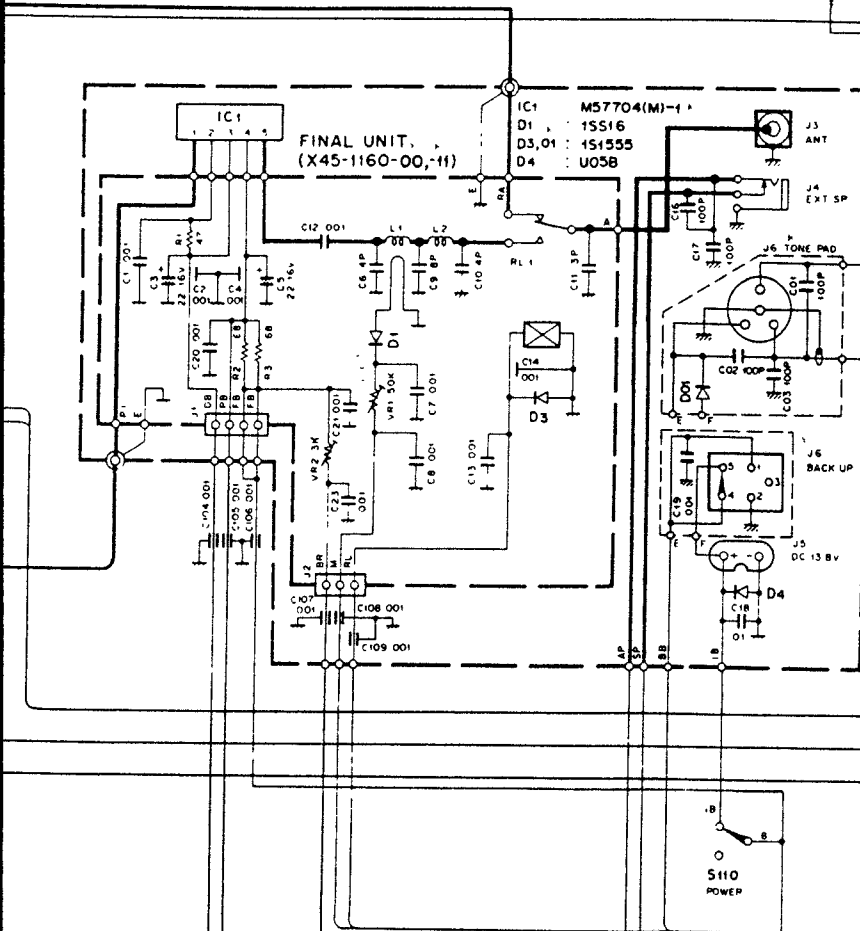
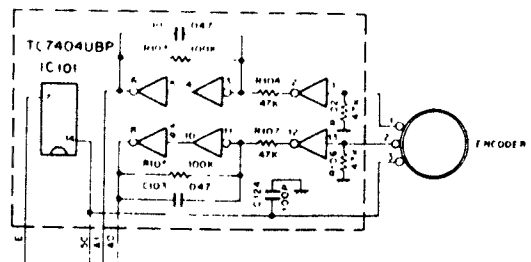
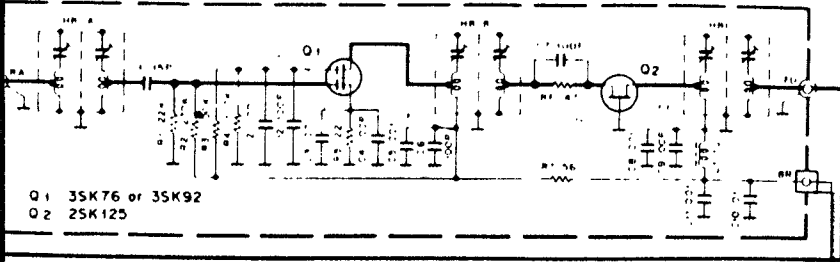
550C-100  
042BP





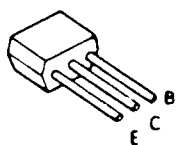
# Schematic Diagram (K)(X) TR-8400

RF UNIT (X44 1350 00,11)

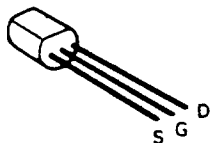




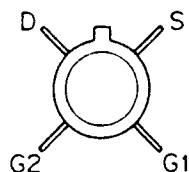
2SA1115  
2SC2603



2SK30A  
2SK125

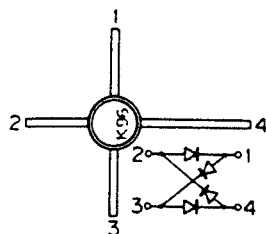


3SK48  
3SK76  
3SK92

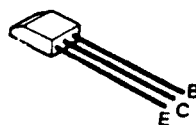


TOP VIEW

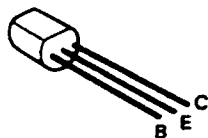
ND487C2-3R



2SC460

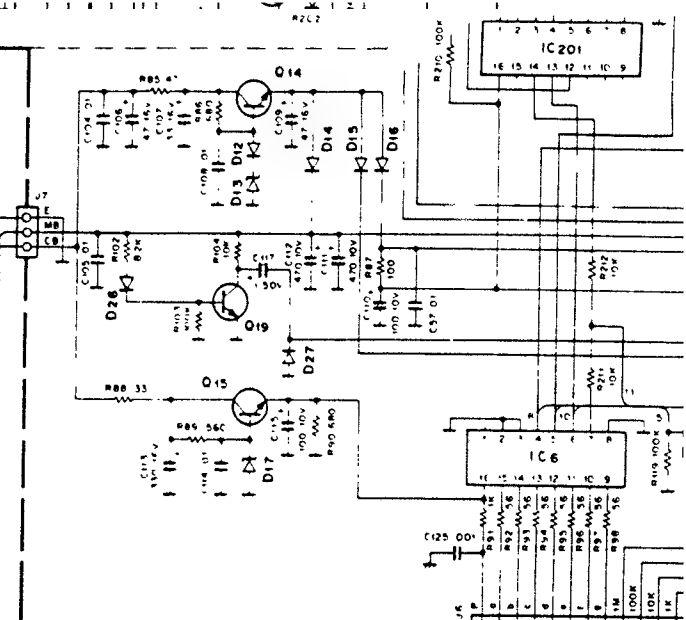


2SC2026  
2SC2407

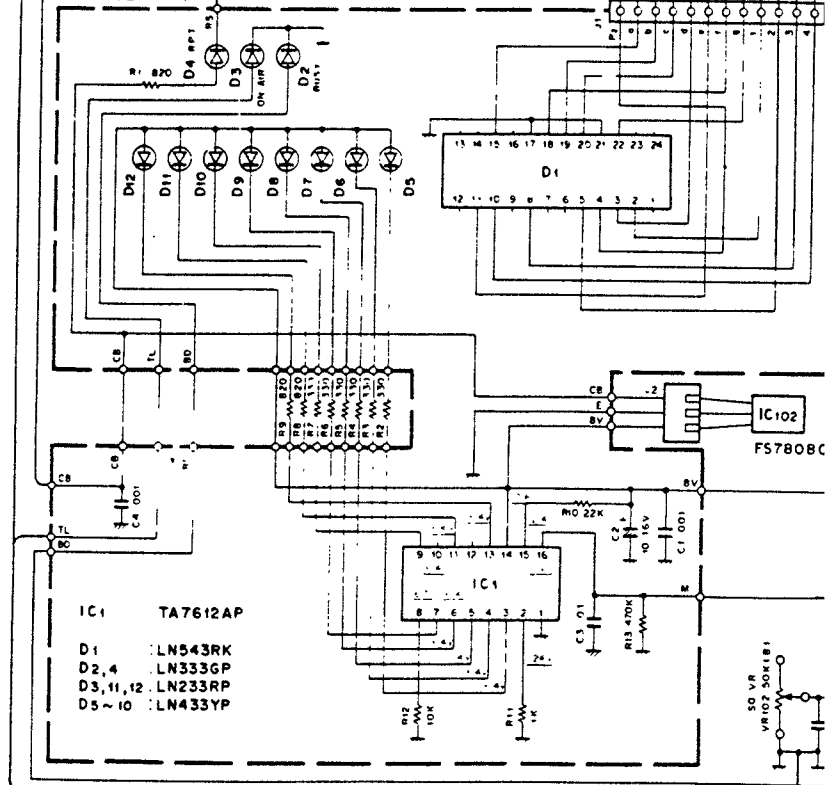


Q1 2SK125  
Q2,13 2SC2212  
Q3 2SC2026  
Q4 3SK76 or 3SK92  
Q5 2SC1775(E)  
Q6,9,10 2SC2603(D,E)  
Q7 2SK30A(O)  
Q8 2SC2240(GR)  
Q11,12 2SC1923(O)  
Q14,20~22,201 2SC1959(Y)  
Q15 2SC496(Y)  
Q19 2SC1815(Y)

D1 1S2208  
D2 M1301  
D3 1SV505  
D4,5 BA2435  
D6 ND487C2-3R  
D7 XZ-062  
D8~11,207 BA244A  
D12,14~16,27,31,51,211,215 1S1555  
D13,17 XZ-066  
D26 MA522(O)  
D28,33~40,47~50,210 1N60  
D201~204,205 1S2588



INDICATOR UNIT  
(X54-1520-11)

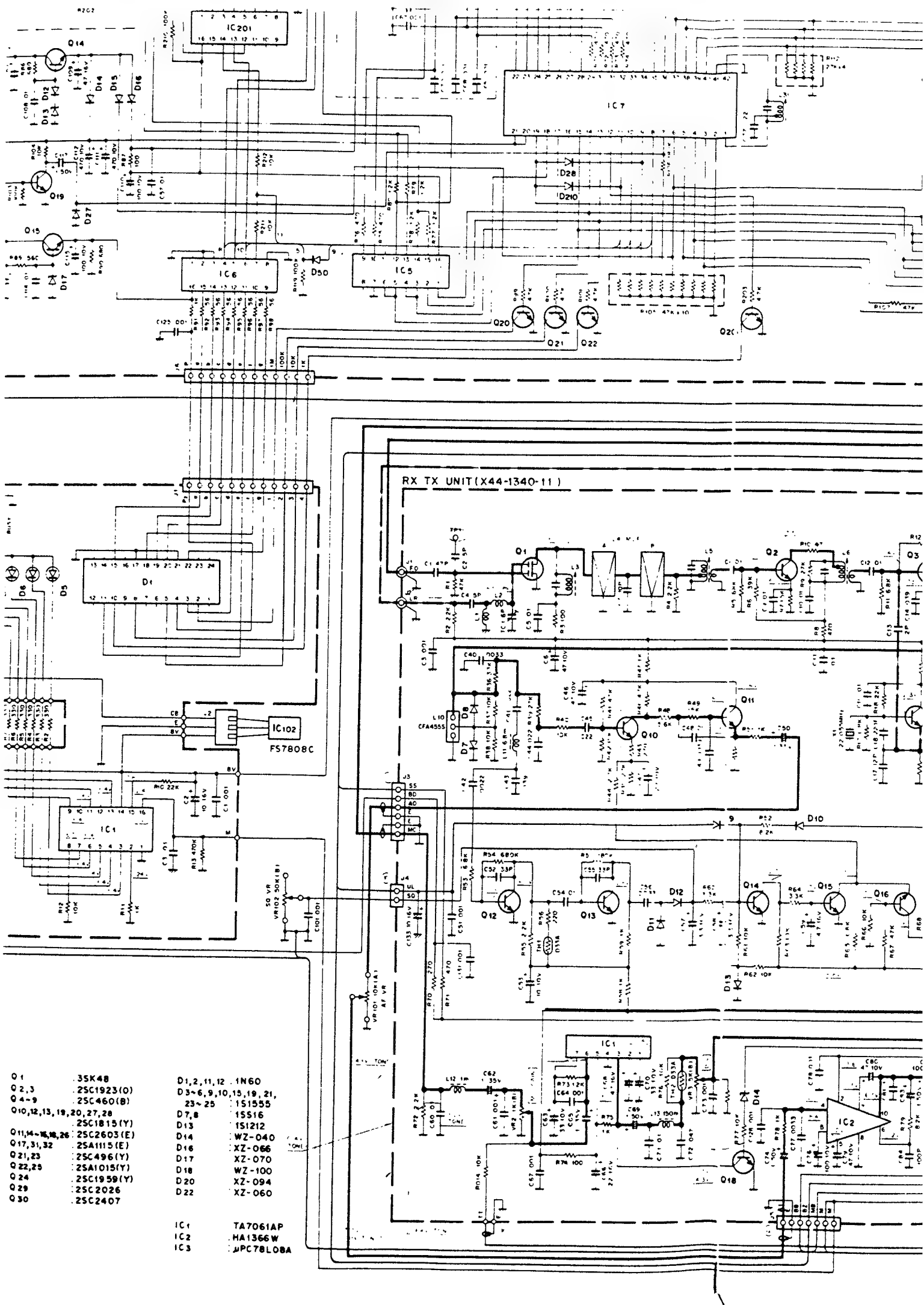


————— Signal  
- - - - - Control  
————— Common DC line

Q1 3SK48  
Q2,3 2SC1923(O)  
Q4~9 2SC460(B)  
Q10,12,13,19,20,27,28 2SC1815(Y)  
Q11,14~16,18,26 2SC2603(E)  
Q17,31,32 2SA1115(E)  
Q21,23 2SC496(Y)  
Q22,25 2SA1015(Y)  
Q24 2SC1959(Y)  
Q29 2SC2026  
Q30 2SC2407

D1,2,11,12 1N60  
D3~6,9,10,13,19,21,23~25 1S1555  
D7,8 1S1516  
D13 1S1212  
D14 WZ-040  
D16 XZ-066  
D17 XZ-070  
D18 WZ-100  
D20 XZ-094  
D22 XZ-060

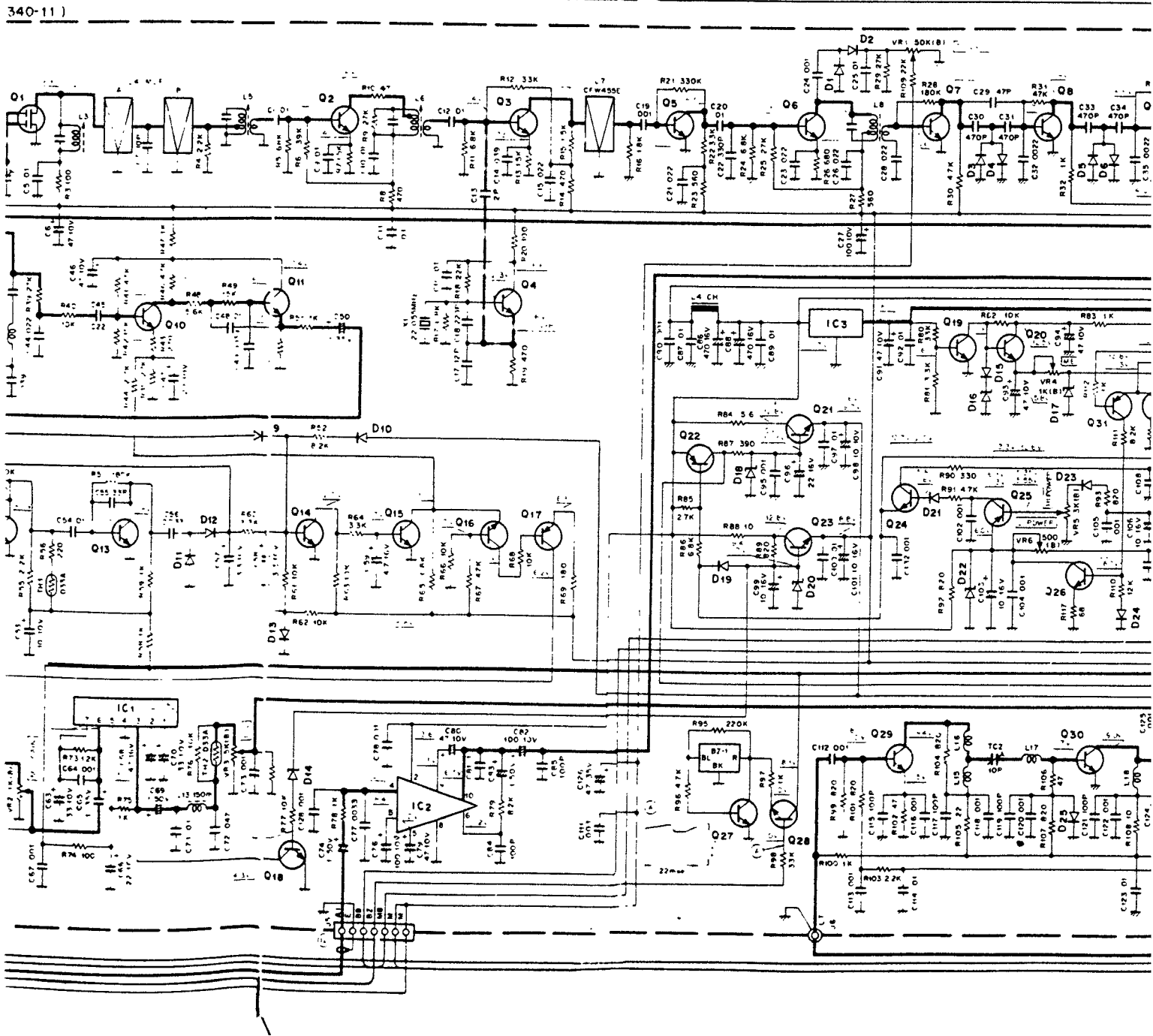
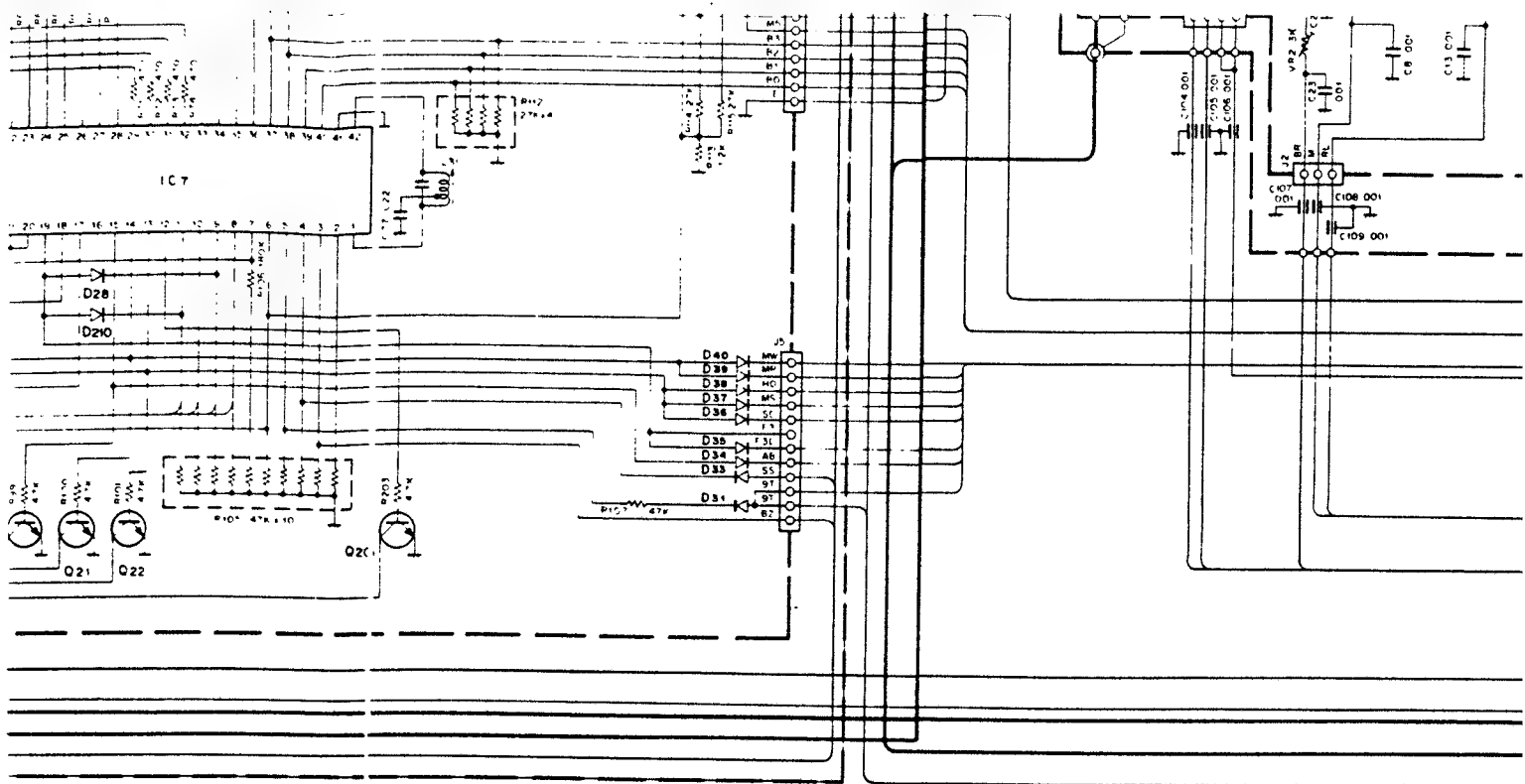
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IC2 HA1366W  
IC3 μPC78L08A

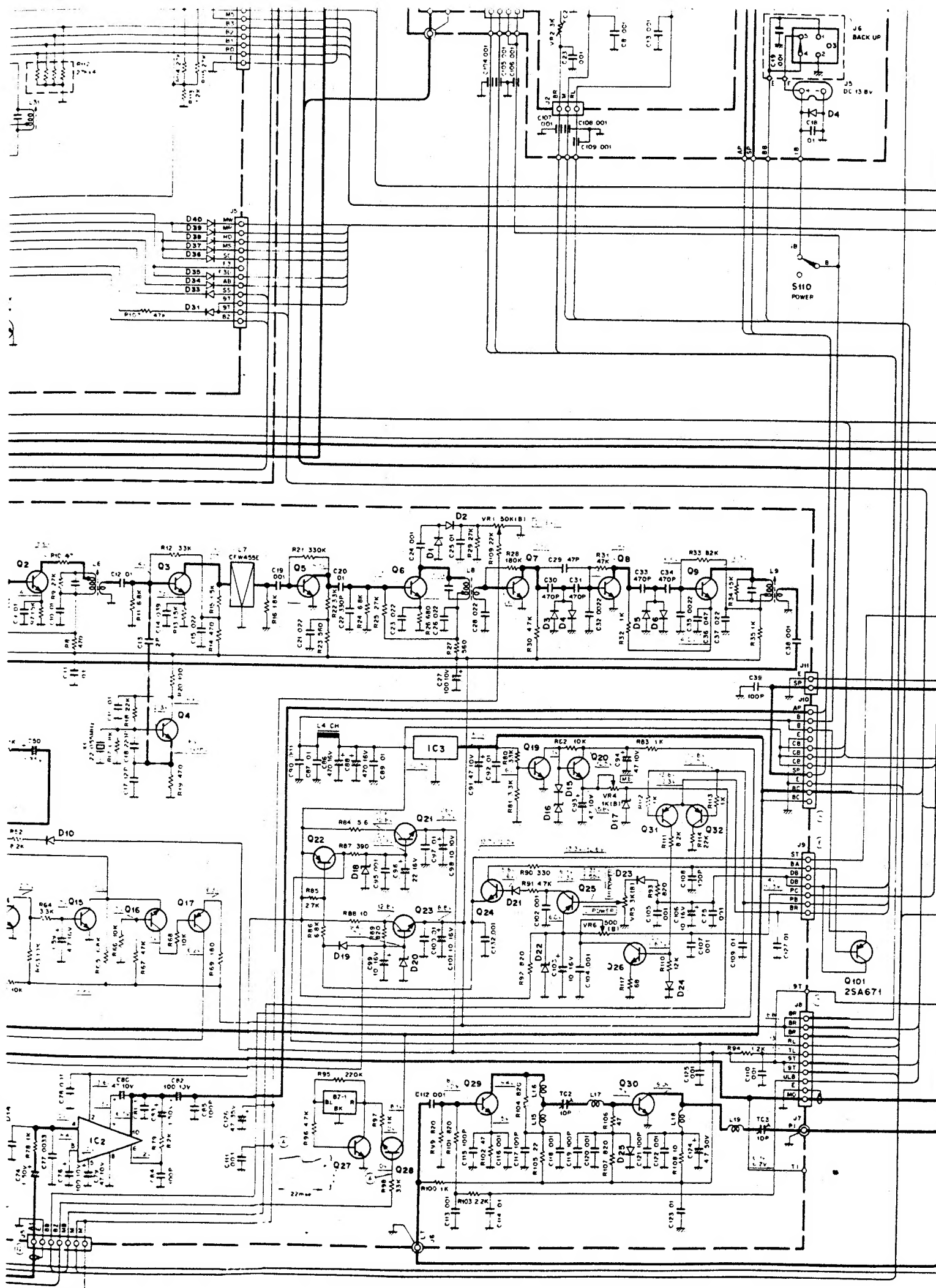


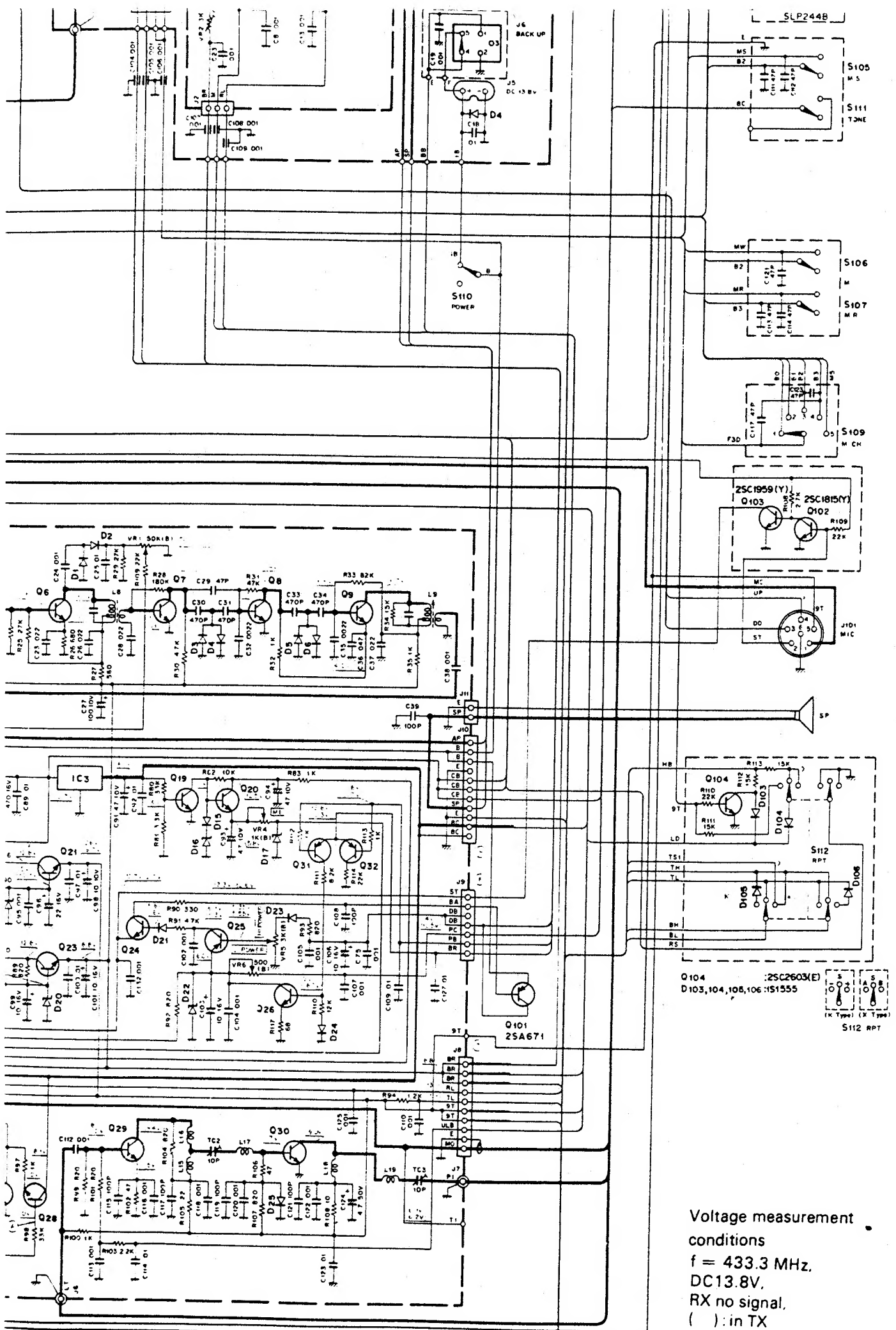
- Q 1 35K48
- Q 2,3 25C1923(O)
- Q 4-9 25C460(B)
- Q 10,12,13,19,20,27,28 25C1815(Y)
- Q 11,14-16,18,26 25C2603(E)
- Q 17,31,32 25A1115(E)
- Q 21,23 25C496(Y)
- Q 22,25 25A1015(Y)
- Q 24 25C1959(Y)
- Q 29 25C2026
- Q 30 25C2407

- D1,2,11,12 1N60
- D3-6,9,10,15,19,21,23-25 1S1555
- D7,8 1S516
- D13 1S1212
- D14 WZ-040
- D16 XZ-066
- D17 XZ-070
- D18 WZ-100
- D20 XZ-094
- D22 XZ-060

- IC1 TA7061AP
- IC2 HA1366W
- IC3 JPC78L08A







# PS-10/SP-40

## PS-10

Ref. No.	Parts No.	Description	Re- marks
	A01-0776-13	Case (upper)	☆
	A01-0777-03	Case (lower)	☆
	A20-2384-03	Panel (T)	☆
	A20-2835-03	Panel (K)(W)(X)	☆
	B05-0715-14	SP grill cloth	☆
	B46-0058-10	Warranty card (K)	☆
	B50-2732-00	Operating manual (K)(W)(X)	☆
	B50-2733-00	Operating manual (T)	☆
	C90-0826-05	E 15000 $\mu$ F 25V	☆
	C91-0456-05	C 0.047 $\mu$ F 25V	
	D32-0075-04	Switch stopper	
	E08-0471-05	4P socket T.PAD (K)	
	E09-0471-05	4P plug T.PAD (K)	
	E11-0404-05	3P phone jack	
	E30-0181-05	AC cord with plug (K)	
	E30-0185-05	AC cord with plug (X)	
	E30-0585-05	AC cord with plug (W)	
	E30-0602-05	AC cord with plug (T)	
	E30-1656-05	DC cord 13.8V	
	E30-1665-15	Cord with 3P connector BACK UP (T)(W)(X)	☆
	E30-1666-05	Cord with plug SP	☆
	E30-1673-05	3P cord BACK UP, T.PAD	☆
	F05-1023-05	Fuse 1A $\times$ 2 (T)(W)(X) $\times$ 1 (K)	
	F05-2023-05	Fuse 2A $\times$ 2 (K)	
	F20-0078-05	Insulating sheet $\times$ 2	
	F29-0014-05	Shoulder washer $\times$ 2	
	G10-0604-04	Cushion cloth $\times$ 2 (Lower case)	
	G13-0641-14	Cushion	☆
	H01-2687-04	Carton (inside) (K)(W)(X)	☆
	H01-2688-04	Carton (inside) (T)	☆
	H12-0469-03	Packing fixture (F)	☆
	H12-0471-03	Packing fixture (R)	☆
	H12-0472-04	Cushion	☆
	H25-0029-04	Accessory bag (Fuse)	
	H25-0049-03	Accessory bag (Foot, screw)	
	H25-0106-04	Protective bag	
	J02-0022-05	Foot $\times$ 4	☆
	J02-0421-04	Assistant foot	☆
	J19-1317-04	Diode holder $\times$ 3	
	J41-0006-05	Cord bushing $\times$ 3	
	J41-0024-15	Cord bushing (T)(W)(X)	☆
	J42-0420-05	Cord bushing (BACK UP)	
	J42-0422-05	Cord bushing (K)	
	J61-0019-05	Vinyletie	
	K29-0739-04	Knob	☆
	L01-8096-05	Power trans.	☆
	N30-3006-46	Round screw $\times$ 8	

## SP-40

### SPECIFICATIONS

**Speaker size:** 57 mm  
**Maximum input:** 3W  
**Impedance:** 4 ohms  
**Frequency response:** 400 Hz — 5 kHz  
**Input plug:** 3.5 mm (dia) 1/8"  
**Dimensions:** 2-11/16 (3) W  $\times$  2-1/2 (2-7/8) H  $\times$  2-1/8 (2-5/32) D inch  
68 (76) W  $\times$  64 (72.5) H  $\times$  53 (54) D mm (projections)  
**Weight:** 0.44 lbs (200 g)

Ref. No.	Parts No.	Description	Re- marks
	N32-3006-46	Flat screw $\times$ 3	
	N35-3006-45	Bind screw $\times$ 9	
	N35-3008-45	Bind screw $\times$ 4	
	N87-2606-46	Self tapping screw $\times$ 2	
	N87-3006-46	Self tapping screw $\times$ 11	
	N87-3008-46	Self tapping screw $\times$ 4	
	N87-3016-46	Self tapping screw $\times$ 2	
	N87-4010-41	Self tapping screw $\times$ 4	
	N89-3006-45	Self tapping screw $\times$ 7	
	S31-2027-05	AC volt. switch	
	S40-2418-05	Push switch (POWER)	☆
	T07-0210-05	Speaker	☆

## AVR UNIT (X43-1350-01)

Ref. No.	Parts No.	Description	Re- marks
C1	C91-0456-05	C 0.047 $\mu$ F	
C3	CE04W1C100	E 10 $\mu$ F 16V	
C4,5	C91-0456-05	C 0.047 $\mu$ F	
C6	CE04W1C222MA	E 2200 $\mu$ F 16v	☆
	E23-0047-04	Square terminal	
	J13-0401-05	Fuse holder	
VR1	R12-2015-05	Trim. pot 5k $\Omega$	
VR2	R12-1016-05	Trim. pot 3k $\Omega$	
R14,15	R92-0618-05	Metal film 0.1 $\Omega$	☆

## INDICATOR UNIT (X54-1530-00)

Ref. No.	Parts No.	Description	Re- marks
C1	CE04W1E101M	E 100 $\mu$ F 25V	

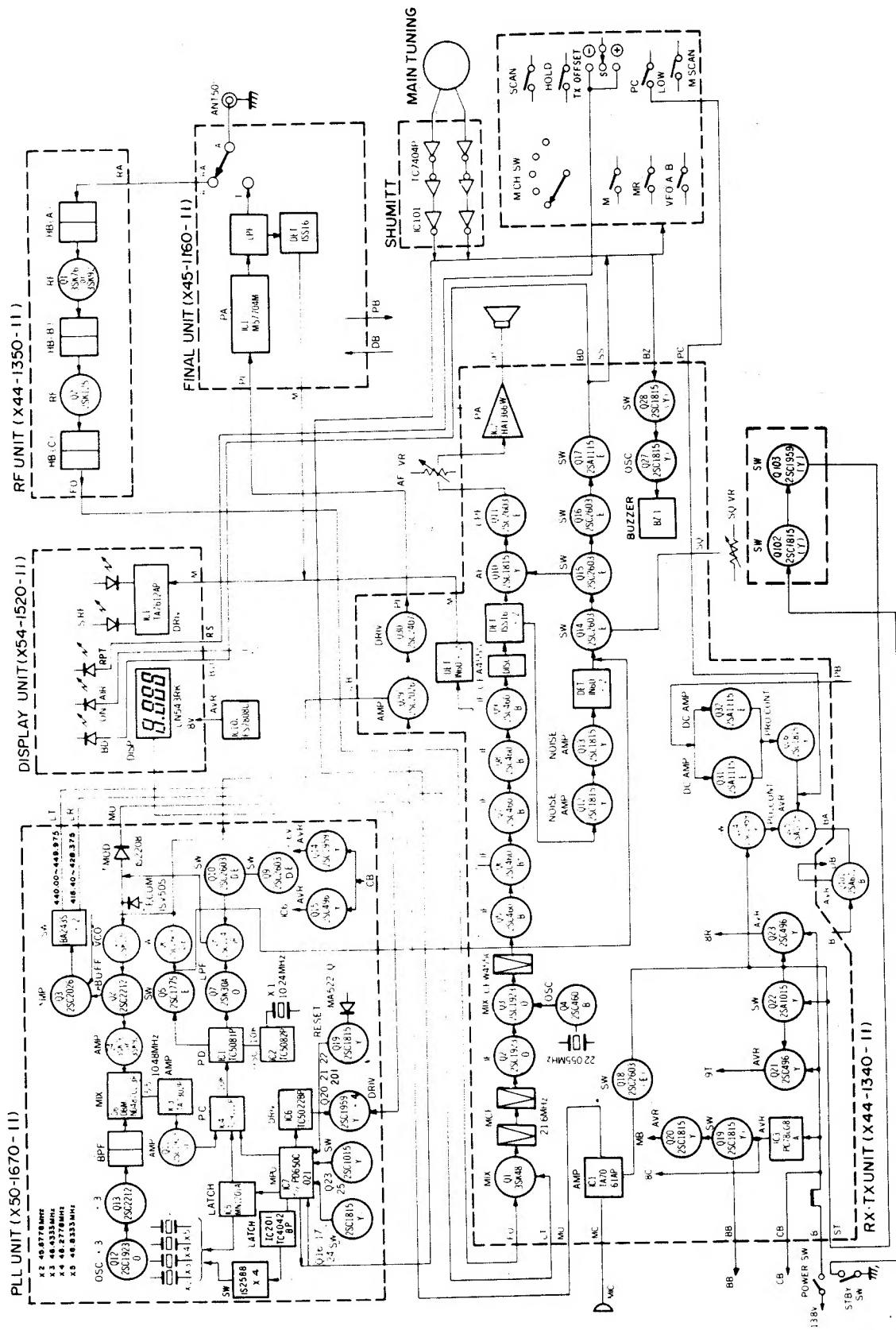
## PS-10 Semiconductor

Ref. No.	Parts No.	Description	Re- marks
Diode	1N4448	V11-7766-06	
	1S1555	V11-0076-05	
	M4B-51-11	V11-2164-06	
Zener-Diode	XZ-060	V11-4101-20	
	WZ-130	V11-0297-05	
	XZ-137	V11-4161-76	
LED	TLG-205	V11-3162-86	Green
	TLR-205	V11-3162-96	Red
	TLY-205	V11-3163-16	Yellow
TR	2SA473(Y)	V01-0473-06	
	2SA1015(Y)	V01-1015-06	
	2SC1815(Y)	V03-1815-06	
	2SC1959(Y)	V03-1959-06	
	2SD525(O) or (Y)	V04-0525-26	

## SP-40

Ref. No.	Parts No.	Description	Re- marks
	E30-1667-08	Cord with plug	☆
	J02-0422-08	Foot	☆
	J19-1336-08	Auxiliary mounting plate	☆
	N09-0620-08	Screw for foot	☆
	N09-0628-08	Screw for aux mounting plate	☆
	N09-0629-08	Screw for foot	☆
	N14-0404-04	Flange nut	
	N32-3014-46	Flat screw	
	N99-0306-04	Hex head bolt	☆
	T07-0211-08	Speaker	☆

## BLOCK DIAGRAM



A product of  
**TRIO-KENWOOD CORPORATION**  
17-5, 2-chome, Shibuya, Shibuya-ku, Tokyo 150, Japan

**TRIO-KENWOOD COMMUNICATIONS, INC.**  
1111 West Walnut Street Compton California 90220 U.S.A.  
**TRIO-KENWOOD COMMUNICATIONS, GmbH**  
D 6314 Steimbach TS Industriestrasse 8A West Germany  
**TRIO-KENWOOD (AUSTRALIA) PTY. LTD.**  
30 Whiting Street Artarmon Sydney NSW Australia 2064